The Builder.

VOL. LII. No. 2212. SATURDAY, MAY 28, 1887

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Applied Mechanics and the Resistance of Materials.

THE stability of structures depends upon that branch of applied mechanics which deals with the resistance of materials. The majority of writers upon this subject treat it in too abstract a manner for ordinary use, and illustrate it by conventional examples simplified to suit the formulæ, so that a reader unfamiliar with the higher mathematics finds that either the reasoning is beyond him or the examples are not sufficiently practical to guide him in the actual cases arising in his daily routine. The writer of the portly volume before us* endeavours to place himself in the position of the average professional man, and, while simplifying as much as possible the statement of the principal theories, he shows various methods of application, chiefly graphic, and then takes as illustrations numerous examples borrowed from every-day practice. The general method of the book has our warmest approbation; though lacking somewhat of the preciseness of allied works, the deficiency is more than compensated for by the extensive range of information and the lucid manner in which it is put before the reader. An English translation would, we think, be very acceptable, as the only work of the kind we have now is Col. Wray's "Some Applications of Theory to Construction," which partakes more of the character of a student's note-book than a compendium of the mechanics of construction. The author's remarks upon his mode of dealing with the subject are suggestive. He says that when one endeavours, not to establish formulæ more or less ingenious, but to arrive at simple conclusions, clear and practical, he quickly perceives how much the theories are actually obscure on certain points, incomplete upon others, and too often remain mute upon questions which particularly interest the practitioner, who is then obliged to fall back upon empirical formulæ, which are only reliable within very narrow limits. While keeping the practical requirements ever in view, M. Planat has introduced just sufficient theory to justify his conclusions, and his work therefore appeals to that class of professional men who like to know something of the "why" as well as the "how." Its general scope includes fundamental principles, moments of inertia, simple beams under various conditions, columns and pillars, compound beams, trusses of wood and iron, arched trusses, pressure of earth, and equilibrium of walls and arches Each section is amplified by division into subsections, and these latter, so far as possible, are individually treated under the heads of experimental data, formulæ, graphic diagrams, and examples of application.

Commencing with the alteration which a body undergoes when subjected to stress, it is shown that all the various strains are reducible to the six elementary displacements, and these again may be classified under the ordinary deformations of *allongement*, or lengthening; *raccourcissement*, or shortening; *glissement*, or sliding; *torsion*, or twisting; and *flexion*, or bending. These deformations are accompanied by reciprocal internal efforts or stresses, classified as *extension*, or tension; *compression*, or compression; *cisaillement*, or shear; *torsion*, or torsion; and *flexion*, or bending; the last two being measurable by moments instead of by direct effort. The action of external forces is then analysed, particularly in relation to the internal forces engendered by them. In the next chapter we have some useful information upon the phenomena of experiments, and the author reminds us that in practical work we do not so much want to know the ultimate limit of strength as the internal state of the material under ordinary stresses which do not surpass the elastic limit, and he refers to this later on in greater detail. We then have diagrams showing "*la marche des phénomènes*" for various qualities of iron and steel, the extension produced by the load until rupture occurs being graphically delineated.

An interesting illustration is a Creuzot experiment: a test piece of wrought-iron plate of the usual form, with a hole at each end for applying the load, and the sides cut away from the middle portion, is ruled all over with lines making small equal squares, and is shown after rupture by tension, the alteration in shape of the squares presenting a self-evident picture of the nature of the internal strains throughout the piece. Following this are some comparative curve diagrams of the lengthening and shortening of wrought and cast iron under tension and compression, which are most instructive, although their character is now pretty well known. An account of experiments upon steel and wrought iron at temperatures ranging from 25° C. to 100° C. shows that steel is rather stronger at the lower temperatures, while iron is slightly weaker. The experiments on timber, as is usually the case, are very meagre; there is certainly scope at the present time for a new series of investigations upon this material, and we trust that before long some one will take the matter up.

The next chapter, upon stone, is of some importance to the architect, the more so as in what little has hitherto been written it has been treated without much detail. A long course of experiments was undertaken by M. Michelot, in connexion with the new Opera House of Paris, to determine the strength of various building stones. The first point established was a confirmation of Rondelet's statement that the resistance was proportional to the sectional area; secondly, that the safe load should be rigorously limited to one-tenth of the crushing weight of ordinary stone, while the limit may be raised to one-sixth for hard homogeneous stone, well proportioned and carefully bedded. Then it was proved that non-stratified stone might be placed in any position "*de lit ou de champ*," with equal effect, but stratified stone must always be placed on its natural bed, or so that the pressure is perpendicular to the stratification. Testing stone when wet, as against the same stone dry, it was found that in some cases it lost one-third to one-fourth of its resistance, and some freshly-quarried stone only gave half the resistance which was obtained after it had become dry and seasoned. With stone belonging to the same general class the strength was found to vary with the density, and the results for limestones being plotted gave a very definite hyperbolic curve. It is shown that this curve may be used for ascertaining approximately the resistance of any limestone from the weight of a small cube, and a similar curve laid down from experiments upon other stones would give a like result in their case. Rondelet's experiments upon superposed stones are recapitulated in a useful form, and the reduction of strength from a monolithic pillar is shown to vary with the number of joints. For sandstone, the graphic diagram of strength compared with density is an undulating curve, but the examples given are not sufficiently numerous to settle this definitely for other varieties. In testing grit stone and schists, the great variation of strength due to the presence of fissures and cracks is noticed. In the chapter upon limes, cements, mortars, and concrete, no mention is made of any of the English engineers,—Pasley, Reid, Grant, and others,—who have experimented and written upon the subject, although the results they obtained appear to be adopted. The ultimate tensile strength of lime mortar with sand in proportion of 3 to 1 is about 14 lb. per square inch as a minimum, and the compression strength 72 lb. per square inch; the difference after ten days is not very notable, although to some extent age adds strength.

* Pratique de la Mécanique Appliquée à la Résistance des Matériaux. Par P. Planat, Directeur de *la Construction Moderne*. Première édition. En vente: aux Bureaux de *la Construction Moderne*, 8, Place Boieldieu, Paris. 1887.

The author discusses at some length the relative value of experiments upon (*a*) the limit of elasticity, and (*b*) the ultimate strength of materials. In England the majority of experiments have been conducted with the view of ascertaining the latter, and the working loads are still usually calculated as bearing a certain ratio to it. Recently, however, since autographic test-recorders have been brought into use, it has been seen that the ultimate strength is more or less a matter of accident; that after a certain point is reached it is essentially a question of time, and that only up to the limit of elasticity does the material follow any exact law. In France, on the other hand, the limit of elasticity is looked upon as the only valuable criterion, and the matter has been the subject of some important discussions before the Société des Ingénieurs Civils. In Germany the chief experiments are those which fix the maximum load that ceases to produce rupture, whatever be the number of times it is applied or removed, and the working load is fixed at a certain fraction of this maximum; all consideration of the limit of elasticity, as such, is ignored, but practically the experiments fix the maximum load as coincident with it, and therefore the actual basis is the same as that of the French engineers.

The next division of the book deals with moments of inertia, showing in a simple manner how they are arrived at for all leading sections, and graphic tables are given for those most in use, enabling the moments for any section and load to be read off without calculation. Examples follow to exemplify the use of the tables in the selection of rolled girders, &c., to fulfil required conditions. The various methods of supporting beams in general and applying loads are considered, and the moments determined graphically for simple and compound beams, the funicular polygon being introduced where desirable. The use of cantilevers and pieces with overhang is well treated, and the examples are thoroughly practical. Consoles, corbels, balconies, and other forms are included under this head. Two complete sections are devoted to the elucidation of the bending moments of *encastré* and continuous beams, and this is perhaps necessary, because it is a part of the subject generally much neglected. To take a simple instance:—In the case of a beam uniformly loaded, continuous over two spans, Rankine shows that about $18\frac{1}{4}$ per cent. of the total load rests on each of the outer supports, and $63\frac{1}{2}$ per cent. on the centre. Other writers virtually agree with this, in dividing the load as $\frac{3}{16}$, $\frac{5}{8}$, $\frac{3}{16}$; but the common practice is to divide the load in the proportions $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{4}$; hence there may be many cases in which the central support is receiving 25 per cent. more load than it was designed for.

In dealing with columns, the experiments of Hodgkinson are mentioned as those which have exercised the greatest influence upon construction, and the principal ones are detailed. The American repetition of these experiments with more powerful apparatus, and particularly the experiments upon built-up columns of wrought iron up to 14 in. diameter, are favourably criticised, and the conclusion drawn that Rankine's formula applies more exactly than that of Gordon to the observed results. "See now in what embarrassment the French constructor finds himself: we have at our disposal the formulæ of Hodgkinson, drawn directly from his experiments, the first in date; their form presents certain conveniences, in spite of many anomalies, and one often uses them; we have also the two formulæ of M. Love employed with equal constancy, of a form a little more simple; we have finally the two English and American formulæ that we exhibit, sustained, as all those which precede, by experiment." The author then goes on to show that the imperfections of the theory, giving rise to these different formulæ, are due to the ordinary assumption that the deformation of materials under stress proceeds uniformly up to the limit of elasticity, whereas the assumed straight line is actually part of a hyperbolic curve. Some of the discrepancies of the theories were pointed out nearly twenty years ago in a paper before our Society of Engineers, but little or no progress has been made in practical adaptation.

The value of any formula is tested by plotting curves from it and comparing all known experiments; M. Planat does this in the case of columns, and a series of twenty-three of Hodgkinson's experiments show a remarkably close approximation. The graphic table, however, relating to oak and fir posts is based upon very few experiments, and hardly seems to accord with them.

We now come to the chief examples from practice, and these include a great variety and number of all kinds, forming a synopsis of the theory of construction particularly suitable for architects. It supplies a want often felt by practical men when they apply to books for assistance; they see some theory apparently suited to their purpose, but they lack either the skill or the patience to work it out. Here there are so many examples worked out that one may find almost the identical case required. Floors of brick, iron, concrete, and wood, trussed beams, trellis and lattice girders, bowstring and parallel, and other forms, are worked out, some useful notes being added upon the arrangement of the various joints. The chapter on riveting is brief and rather weak; a few general principles only are enumerated, and some examples of covers to joints worked out. Nothing is said as to general riveting, and many other points which would have to be studied before attempting to design an iron structure of any magnitude. Roof trusses, cranes, compound trusses, centres for vaults, and the carpentry of spires are among the general examples given, and many of the forms are not to be found in other books: hence the solution of these problems has an additional value; the iron trusses include many varieties, the stresses in which are worked out in detail. A matter that is often insufficiently considered is the effect of temperature upon iron construction. It is here illustrated by a trussed rafter roof of 20 mètres span, where it is shown that, if the ends were fixed, an additional load, equal to one-third of the breaking-weight, would be caused by the extreme variation of temperature, and this, in addition to the ordinary load, would cause a dangerous stress. A chapter on curved beams is carefully worked out, and theory compared with practice. In the section on the thrust of earth and construction of walls the information is very clear and simple, enabling one to design retaining walls under any given conditions. The safe load in foundations upon gravel or dry sand is given as equal to $3\frac{1}{2}$ tons per square foot, and upon virgin soil as $1\frac{3}{4}$ ton. The friction of masonry on masonry, with fresh mortar, equals 0·5 to 0·7; masonry on earth or ordinary sand, 0·57; on dry clay, 0·51; and on tempered clay, 0·3. A *résumé* of the experiments of M. Gobin upon the thrust of earth is given, but while those experiments were sufficient to prove the general theory, they were naturally surrounded with so much difficulty of manipulation that their practical value is considerably limited. To compensate for this, we are presented with a good collection of examples of retaining-walls for earth and water, and also of walls for buildings. For arches and vaults, graphic diagrams are given, from which can be measured the dimensions for given loads and spans, similar to those for girders and beams. The book closes with a section upon vaulted roofs for churches, and flying buttresses, the reasoning in which is made perfectly clear by graphic diagrams. In fact, so much use of graphic curves has not before been made in any work which has come under our notice, although the modern engineer is well aware of the value of plotting all experiments and empirical data amenable to this method, as a check upon their accuracy; and the value of the system, for all manner of purposes, cannot be over-estimated.

In various small matters we should hardly be inclined to accept the author's dictum; and some of the woodcuts, not being drawn to scale, give a false impression, but in view of the very great utility of the work as a whole, we abstain from calling more specific attention to what, after all, are not serious faults. It is the sort of book we want to enable education to keep pace with the increasing demands made on the practical knowledge of the architect and engineer, and is a good attempt at a combination of theory and practice.

THE ARCHITECTURAL ASSOCIATION SKETCH-BOOK.

IN preparing for the issue of the first part of Vol. VII. (new series) of the Architectural Association Sketch-book, the Committee append to their usual circular in regard to the objects of the Sketch-book, the conditions of contributing, &c., a special note calling the attention of subscribers to the fact that by enlarging the number of members, and consequently increasing the income at the disposal of the Committee, various improvements might be introduced and the usefulness and artistic value of the work increased. From another official circular we learn that one of the contemplated improvements is to include several coloured plates in the next volume, a form of illustration which, multiplying as it does the operations of printing, of course adds materially to the cost of the volume.

It is with a desire to assist in this extension of the suffrage in regard to the Sketch-book that we devote a few lines to a special recommendation of it to the notice of those members of the profession (a very large number, as will appear) who are not subscribers to it, and are presumably more or less unacquainted with the character and contents of the collection; and that on their own account as well as on the account of the Sketch-book Committee. We are exceedingly surprised to note in the last report that the number of subscribers for the year 1885-6 was only 205. The subscription is a guinea, and for that sum the subscriber obtains twelve numbers, each containing six plates reproduced from as many original drawings: seventy-two larged-sized sketches, some of them finished drawings, all well executed, some representing some of the best architectural draughtsmanship of the day, and illustrating many buildings or details which are little known, and of which no other illustration is perhaps in existence or attainable. The contents are of a nature to meet the most catholic tastes. They include measured drawings, some of them of the most careful and finished execution; sketches of picturesque architecture, all up to at least a fair standard, many admirable, some few of them remarkable; drawings of decorative work of various descriptions, also drawn in many cases from out-of-the-way and little known works. Even independently of any use which may be made of it as a "source of inspiration," or, in other words, a capital publication to "crib" from, the Sketch-book is a most pleasant and interesting collection of plates to turn over, and, if known to them, would probably be welcome even to many who are not professedly architectural students, but who care enough for architecture to value a collection of good architectural sketches. To architects it certainly ought to recommend itself as one of the most interesting publications of the day in the way of architectural illustration. The small number of subscribers to the work can only be accounted for by supposing that a great many of the profession are not acquainted with the contents and the interest of the book.

Each of the twelve parts in a volume is made up of three transfers, two photolithographs, and one ink-photo or chromo-litho. The "transfers" are tracings on lithographic tracing paper from the original sketch. We presume this method is encouraged to a certain extent for the sake of greater economy of production, as the cost of photolithographing is saved; but drawing on transfer paper can seldom have all the freedom of a drawing on ordinary drawing paper; the surface of the transfer paper is not favourable to the free working of the pen. We observe some directions are given in the notice to subscribers as to the use of tracing transfer

paper, pointing out that "the side of the paper for writing on is the one which adheres most firmly to the thumb and finger when slightly damped and the paper pressed firmly between them" This is rather a round-about test. The right side for drawing on has a thin composition on it which gives a slight glaze to the surface; the wrong side has a duller surface; no one who has once seen it can make a mistake. On most sheets of "transfer" the maker's stamp is placed on the working side of the paper, which is another safeguard against mistakes. In regard to the lithographic ink, the note is made that there is no necessity to rub it quite "black," which is true; but he who works with black ink will judge better what is the effect he is producing, as the impression will come out black anyhow, unless it is taken off in a brown or red or other tinted ink.

The larger proportion of the drawings in the Sketch-book are of the order of picturesque or freehand sketches; there are a certain number of measured drawings, however, and those which are carried out in this manner are very well and carefully executed. In the last completed volume (vi.) we may point out especially Mr. Shearman's measured drawings from Westminster Abbey, for instance, which are executed with admirable clearness and precision. Mr. Lewis's coloured drawings of bits of glass diaper from Thaxted Church are of considerable interest as out-of-the-way bits of glass detail. Ornamental subjects have been coming more to the front lately in the Sketch-book; and some of Mr. Vacher's, from old brocades, printed in white and a delicate grey, are very well executed both by draughtsman and lithographer. Mr. Ambler has too much of the ruler in his perspective sketches, which look rather hard and toneless in consequence, though careful and precise. Mr. W. Riley's "The Folly, Settle, Yorkshire," is a good example of another type of illustration, picturesque pen sketches of picturesque old houses. All sorts of delightful "bits" of this kind are to be found in turning over the Sketch-book; and if they are used as hints, and not as mere eccentricities to be reproduced in modern buildings, they may be as useful as they are pretty. Mr. W. R. Lethaby is not so well represented in this volume as in the last, where his powerful sketch of the interior of Tewkesbury was the finest thing in the volume; but his sketch of decorative details, "Roman and Renaissance," is admirably free in touch and execution, and makes a most interesting page. A drawing by the late Mr. Deshon, "St. John, Devizes," is one to be noted, as also Mr. Bidlake's drawing, a lithograph printed in red, of the pastoral staff preserved in Westminster Abbey; an excellent bit of detail sketching. The Renaissance iron-work from All Hallows, Barking, "measured and drawn out full size on the spot," by Mr. Rix and Mr. Bamber, is a very careful illustration of some very curious and charming wrought-iron work. The measured drawings from various portions of St. Paul's, by Mr. R. W. Schulz, drawn out with the greatest minuteness and refinement of execution, are examples of the class of more distinctly architectural drawing,—geometrical elevation, of which, perhaps, there might be more in the book; at all events, if they were as good as these. Pencil seems rather at a discount in the sketches; of course it does not reproduce as well or as cheaply (in general) as ink line; Mr. Hardy's "Palazzo Uguccione" is a nice bit of sketching of this class, however. Mr. Cresswell's drawing of Henry VII.'s tomb, reproduced in light red with a very delicate effect, deserve notice, and Mr. Bidlake's excellent and effective drawing of the Easter Sepulchre at Navenby. And in mentioning these as among the things that attracted us most in turning over the volume, we have omitted many other plates of great interest. Mr. Orpen is to be complimented upon his humorous and clever title-page to the volume before us. The title-page is a new one every year, settled by competitive sketches. The whole volume is an excellent guinea's worth for any architect or any one with a cultivated taste for architectural and decorative work, and we strongly recommend those who think it any object to collect a number of good sketches of architectural subjects, whether for study or pleasure, to turn their attention to the Architectural Association Sketch-Book.

NOTES.

THE death of M. Ruprich-Robert, the eminent French architect, is a real loss to architecture, and one to be felt on both sides of the Channel, inasmuch as his most important labour, that which he valued most, was his work illustrative of Norman architecture in Normandy and in England, a work to which the labours of thirty years had gone, and in the final correction of which he had been recently occupied. To his works and career we shall refer again.

THE Friday evening lecture on "Bridging the Firth of Forth," by Mr. Baker, at the Royal Institution, was in every sense a "popular" lecture, perhaps rather more so than one expected to hear in those precincts, but it was exceedingly successful in the aim which the lecturer evidently proposed to himself, that of conveying a general idea, without going into technical details, of the magnitude of the work, the special difficulties of the task, and the means taken to overcome them. Mr. Baker had prepared a special illustration, which caused some amusement, of the cantilever principle of construction, in the shape of a photograph of a group arranged purposely at the works, showing a living cantilever construction. Two of the main piers were represented by a couple of chairs, on which two men seated represented the central truss supported on the pier; one arm of each figure, outstretched towards the central space, represented the tension member of the cantilever, and each hand grasped the end of a staff, abutting against a rail of the chair, and representing the compression member of the cantilever; a third man on a slung seat in the centre, supported by the other two, represented the intermediate portion of the bridge carried between the two cantilevers. On the outer sides of the two seated figures a rope grasped by the hand and fastened to a heap of bricks, represented the shore anchors of the cantilevers. This living construction was certainly ingenious and amusing, but we have some doubt whether it brought home the facts of the construction to those unacquainted with it better than an ordinary drawing and a simple and precisely-worded description would have done. Models to scale of the Menai tubular bridge and the Forth bridge served to give an idea of the immense scale of this most remarkable of modern engineering works, but this was much better conveyed by the fine series of photographs of various portions of the work in progress, thrown on the screen by a lantern. These also gave a vivid idea of the boldness of the scheme and the unusual conditions under which the work was carried on; the photograph showing the commencement of the compression rib or tube of the cantilever, projecting out into space, and in process of being carried forward through the air, so to speak, with no *point d'appui* for support to the workers except the rib itself, was almost startling in its effect. Mr. Baker paid a well-deserved compliment to the courage of the workmen and the coolness with which they worked under circumstances and in positions certainly calculated to be trying to the nerves. While alluding to the lecture, we may assist Mr. Baker in dispelling one curious confusion of mind to which he alluded, in regard to the locality of the bridge. It appears that its progress is asked after as that of "the Tay Bridge," by about half the persons who make inquiries concerning it, and the suggestion that they mean "the Forth Bridge" is usually accepted merely as an example of the hypercritical accuracy of speech characteristic of engineers!

IT is probable that the fire risks of electric lighting were as grosly exaggerated when the new illuminant was introduced as was the case at the time of the introduction of gas, when people feared to touch the pipes lest they should be burnt. But in the event of bad workmanship, unskilful installation, or carelessness in keeping all the wires dry, the risk of fire is a very real one, and it is most important that all proper precautions should be observed. Mr. Musgrave Heaphey, of the Phœnix Fire Office, was the first to appreciate the necessity of laying down certain rules in accordance with which installations should be carried out, and he formulated these rules five years ago. They were found to be of such value to the fire offices that the ninth edition has now been issued, with the additions and revisions which increased experience has shown to be necessary. The chief points to be attended to are:—1. That the conductors be of sufficient sectional area. 2. That they be properly insulated. 3. That they be kept a sufficient distance apart. 4. That they be covered with waterproof coating. 5. That a sufficient number of automatic safety cut-outs be provided. Details as to the proper methods of ensuring that these conditions should be carried out are given in the rules, and no one should attempt to put up even a small installation without their guidance. There is one matter which we think Mr. Heaphey should alter in his next edition. He says that in passing through party-walls, provision must be made that fire cannot be communicated by the conductors. It is most undesirable that conductors should pass through a party-wall at all, and this should be absolutely forbidden. If several houses are fed with the electric current from a common source, the connexions of the branches with the main should be perfectly separate for each house.

THIS present season will be marked by the more than usual number and extent of certain properties in Scotland which, in the course of two or three weeks, are to be offered for sale at auction. Chiefest amongst these are the Dee-side Estates, including the deer forest of Glentanar, together with Aboyne Castle and its demesne, belonging to the Marquess of Huntly. Extending over 60,000 acres, and with salmon fishings along fifteen miles of the Dee, the property will, failing a purchaser for the entirety, be put up in six lots, each to give certain valuable sporting rights. Of his lordship's house were the celebrated royalist George (Gordon), sixth Earl and first Marquess of Huntly; the as famous Duchess of Gordon, who, in 1711, forwarded the "*Reddite*" medal to the Dean and Faculty of Advocates in Edinburgh; and George, fifth and last Duke, who was familiarly known in his own country as the "Cock of the North," and whose statue has been set up in Aberdeen. When holding a lieutenant-colonel's commission in the regiment now known as the Scots Guards he received letters of service, under date February 10th, 1794, for raising the existing 92nd Gordon Highlanders from amongst his own people in this district. It was his mother Jane, *née* Maxwell, the beautiful Duchess of Gordon, who enlisted most of the recruits with the irresistible bounty of a guinea and a kiss, holding the coin in her lips. Amongst the other estates are Dallas, in Morayshire, covering nearly thirty square miles, and yielding a rental of 3,800*l.* a year; Ballimore, in Argyllshire, of 1,200 acres, prettily situated near to the head of Loch Fyne; Glenrossal, a small but capital sporting estate of some 2,000 acres in Sutherlandshire; and that of Tarvie, in Perthshire, near to Pitlochrie, and adjoining to the Edradour Moor owned by the Duke of Atholl. Also the Glensanda deer forest, on the shores of Loch Linnhe, in Argyllshire, with its 12,000 acres of moor and forest land, having a sea frontage of nearly seven miles; with the neighbouring, but less extensive, estate of Kilmalieu, in the same county, famed for its lochs full of trout, grilse, and salmon; and that of Benmore (10,700 acres), by Loch Eck and its effluent the river Echaig. We should mention, too, the Farrnich property, of nearly 30,000 acres, by Kinlochluichart, county Ross, and the magnificent deer forest of Applecross, in the Macraes' and Mackenzies' country, Ross-

shire, whose 75,000 acres comprise some of the best romantic scenery in Scotland. The tenants of this last-named estate were largely represented in the now 72nd and 78th (Seaforth) Highlanders when those two regiments were originally raised last century by Kenneth, seventh and last Earl of Seaforth, and his kinsman, Lord Seaforth, hereditary Chiefs of Kintail.

AT a meeting of the Sanitary Legislation Conference, on Monday last, the remaining clauses of the draft Act, which is proposed on the Sanitary Regulation of Buildings Bill, were read and agreed to, with only one addition on Clause 10, to the effect that "every certificate for a building used as a hospital shall specify the cubic contents of each ward, and set forth in detail the provision made for warming, lighting, and ventilating each ward." The Bill, however, still retains the unadvisable feature of making "Corporations" penally responsible, and levying penalties against them which will be found to be extremely harmless weapons when there is any occasion to brandish them. The Bill is to come on for second reading on the 22nd of June. It will serve as a feeler to indicate the state of public opinion on the matter of sanitary registration, but any such step requires a great deal more consideration in detail, before final effect is given to it, than appears to have been given in this case.

THE eleventh Congress of Delegates of Fine Art Societies will be held at the Sorbonne from the 31st of May to the 3rd of June. The general meeting will be held on the 4th of June in the large Amphitheatre, the Minister of Public Instruction and Fine Arts in the chair. The Society for the Protection of Ancient Buildings have been invited to send a delegate from their Society to the Congress, and the Society have, we understand, accepted the invitation. It is to be hoped that the meeting will take the statements and views of the society *cum grano*.

THE case of Jackson *v.* The Farnham Water Company is a warning to householders to be sure of their ground before they go to law about their water supply. The plaintiff complained of the insufficiency of the supply of water, because the supply was turned off at ten o'clock every morning. As the Company had not agreed to afford a constant supply, it is difficult to see how the plaintiff could suppose he was wronged. It was proved there was no tank or cistern in the house; but that had clearly nothing to do with the rights and duties of the water company. That an intermittent supply of water is inconvenient, and that cisterns are often the cause of disease, no one, we suppose, can doubt; but the remedy for this state of things is not in actions for breach of contract, but in bringing public pressure to bear on the Legislature, so that they should make a continuous supply imperative by an Act of Parliament.

THE Exhibition of "East London Industries," opened on Tuesday last by the Countess of Rosebery at the People's Palace, Mile End, though interesting enough in its way, hardly comes up to what we had been led to expect. As at first proposed, it was intended, as we understand, that the exhibitors should be entirely or mainly confined to handicraftsmen themselves, but at present exhibitors of this class are few in number. The exhibition was, however (like most other exhibitions), admittedly incomplete on the day of opening, and we understand that several exhibitors belonging to the artisan class have yet to occupy the spaces allotted to them. We will take another look at the exhibition a week or two later. In face of the apathy of the class for whom the exhibition was mainly intended, the Committee seem to have had no option but to allot space to large manufacturers, so that the exhibition presents no marked contrast to other shows of the kind. Among the exhibitors of the artisan class may be named Mr. H. Staynes, well known in connexion with technical education in the building trade, who exhibits an instructive series of diagrams and models illustrating the principles of carpentry and joinery. A dock labourer, named James True, exhibits two or three cabinets made by him in his leisure time; they are much better in workmanship than in design. One or two looms are at work, one of them producing some excellent figured silk for well-known West End firms of upholsterers. The Thames Iron Works and Ship-building Company lend an admirable collection of models of some recent men-of-war, including the *Sans Pareil* and the *Benbow*, and the East and West India Dock Company and the London and St. Katherine's Dock Company lend a series of large models of their respective docks. The proceeds of the Exhibition, which will remain open for three months, will go in aid of the People's Palace Fund.

WE have received from the "Fireproof Cyanite Co." some specimens of paper and cotton stuffs impregnated with cyanite, accompanied by pieces of the same material untreated. The test is perfectly satisfactory as far as it goes. The untreated pieces burned freely when a lighted match was applied; the cyanised pieces, though they blackened in the flame, entirely refused to burn.

THE Exhibition of the Royal Scottish Academy was closed on Saturday, after having been kept open for a somewhat longer period than used to be the case previously to last year, when an experiment was made in that direction which proved successful. This year the experiment has met with a like success, and we are informed that sales have been good and the prices realised high.

THE building erected in Queen-street, Edinburgh, for a National Portrait Gallery and Museum of Antiquities, has been completed so far as contemplated at the outset and as the funds permitted. The unfinished portion, as designed by Dr. Rowand Anderson, consisting of projecting wings at either end of the central oblong, is now to be proceeded with, the donor of the building fund having come forward with a sufficient sum for that purpose. It is now pretty well understood that the anonymous donor is one of the Members for the city, who has displayed even greater munificence in other directions.

A PIANOFORTE, designed by Mr. Tadema, and of which a drawing hangs in the Architectural Room at the Royal Academy, has been on view recently at Messrs. Johnstone, Norman, & Co.'s, in Bond-street. It forms the second portion of a commission for furniture from the designs of Mr. Tadema, given by an American gentleman, Mr. Marquand, with "no limit as to price." The pianoforte is a superb piece of workmanship, and shows a great deal of fine detail in design, of course in a character mainly Greek, or based on Greek work. The main material is ebony, which forms the groundwork of the decoration, the finest and most remarkable portion of which, perhaps, is in the scroll-work which decorates the sides of the instrument, and which is formed of various-coloured woods inlaid but left projecting in relief from the ebony ground, and carved (if we understood aright) *in situ*. The rich and solid effect of this relief inlay must be seen to be duly appreciated; and the truth of execution of the curves deserves the highest praise, especially in the portions of the instrument where the ebony is itself on a curved plan, and the delicate curves of the scroll carving, vertically, have to be adjusted also to this horizontal bend. The top of the piano is covered, unsymmetrically, with inlaid wreaths, filled with the names, in Greek capitals and decoratively arranged, of Apollo and the Nine Muses. The underside of the lid is decorated with bands of inlaid ornament, alternately ivory in cedar and cedar in ivory. The treatment of the arms at each end of the keyboard, in ivory with convex flutings, spreading fanwise as they fall over the curve of the arm, is very fine and massive, with a touch of Egyptian taste about it. The space at the back of the keyboard, under the keyboard fall-cover, is painted by Mr. Poynter with an allegorical subject, "The Wandering Minstrels." The music-desk is of beaten and carved brass inlaid with copper and silver, and is one of the finest bits of work in the whole. Altogether, this is a quite exceptional piece of furniture both in design, material, and execution; in regard to execution, indeed, one may say that it could not be surpassed.

WE mentioned a little while since that it was intended to erect a monument in Vienna to the memory of Mozart, on the space in front of the Opera House. We understand, from a Vienna paper, that it is proposed to have an international competition for the monument, and that 6,000*l.* have already been raised towards this object. Much more than this, however, would be required to erect a monument worth an international competition.

THERE is in Coventry a fine old hall called St. Mary's Hall, and used as the Guildhall of the city. From an advertisement which has been forwarded to us, and which is signed by the Town Clerk of Coventry, it seems that this building is in danger of being evil-entreated at the hands of any one who may offer to do so at the lowest figure. The advertisement in question invites "tenders to supply a complete set of drawings of the exterior of St. Mary's Hall, in all details of mouldings, canopies, tracery, and other parts, according to the original design of the building." This, apparently, must mean a contemplated restoration. In that case the only reasonable thing to do, supposing "restoration" is necessary or desirable at all (about which we decline to speak positively without another inspection of the building), would be to select the architect most eminent for his knowledge of work of that date, and put the matter into his hands. To put the treatment of an old building up to auction, so to speak, in this way, would be a blunder of the first magnitude; and if the only object is to get a restored drawing of the building as it was at first, that is not the way to go about it. To make any such restoration even on paper requires a great deal of knowledge and study, and no architect of standing, we should imagine, would consent to give in his name in a matter of this kind, and give a tender, like a contractor, for supplying a restoration of the Hall. The idea is absurd, and shows an entire ignorance of professional proprieties. All that the municipality will obtain will probably be "tenders" from some few articled pupils or builders' clerks who want to turn a little money; at least, we should be very much surprised if their advertisement drew any one of higher standing.

THE latest "one-man" exhibition of importance is that of Mr. Henry Moore at the Society of Fine Arts; a collection of sketches in oil and water-colour under the title "Afloat and Ashore." The second half of the title indicates that Mr. Moore has gone out of his usual beat, and for once is to be seen as a painter of landscape as well as of sea pieces. Among the landscapes, "Gelli Gynan, North Wales" (2), and "Gorse Time, Thorpeness; Shower passing off" (30), are two of the best and most characteristic. The greater part of the exhibition, however, is occupied by seas in all stages of first sketch and final finish. Among these may be named especially "Evening off the Coast of Normandy" (35), an evening scene with the sunset behind the spectator and lighting up the cliffs opposite,—this is a very fine little work, a mere sketch, remarkable for its effect of light and atmosphere; "A Rough Day, Lowestoft" (11), a rapid sketch of the movement of water; "The Dingy Astern" (15); "A Short Cut to the Mussel Rocks, Wimereux" (20), a grand scene of stormy sunlight; and among the oil paintings "Thunder Shower passing off" (65); "Weymouth Bay and Portland Bill" (66); "Sunset after Storm" (71); "The Jersey Packet" (75), the packet in the distance, and in front a most spirited representation of the pleasant short seas which she

has to tumble over, and which suggest *mal de mer* at once. The large painting entitled "Wreck of an Austrian Barque, Yarmouth" (59), rather suggests questions. The rush and movement of the water is splendidly given, but what about the colour and texture? Certainly we cannot accept this as like any sea water we ever saw. The large moonlight, "Queen of the Night" (51) is a fine sketch in oil of a moonlight effect.

MR. WALTER CRANE'S lecture at the Society of Arts was an eloquent protest in favour of handicraft art, the poetic sentiment that could be enshrined in it, and against everything artistic, being regarded from a pictorial point of view. Mr. Crane appears to have been very desirous also to emphasise the distinction between nature and art, "so often lost sight of." Our present system of designing be described as a search after the superficial naturalism. It might be said that it would be something to know that there was any "system of designing" at all at present. We can hardly recognise that there is, and we should hardly say that the most prominent feature of decorative design at present is a search after naturalism; there is certainly a good deal of practical recognition of the fact that decorative art does not consist in the imitation of nature. Mr. Crane's complaint that industrial organisation had destroyed the art of the people is only too sadly true, for the most part; but the fact is that there is not time, in the present race for life, to give the individual thought and skill to each article produced which is necessary to make it a work of art. Things are wanted quickly and in the mass. We may regret it, but it seems a vain regret for the most part. Circumstances are too strong. It is well to continue to strive against them, for all that, and we are glad to learn in the course of the discussion which followed that the Society of Arts would give its reward and recognition to the makers and not to the sellers of articles. That is a step in the right direction, at all events; and perhaps presently we shall hear a little less of the beautiful designs turned by "——— & Co.," and a little more about the men who really design them.

ARCHITECTURE AT THE ROYAL ACADEMY.—V.

1649, "SOMERVILLE HALL, Oxford," Mr. H. Wilkinson Moore. Hung too high to be well seen; a block of collegiate residences of a suitably homelike character of architecture; the portions between the gables want a little more decisive finish at the eaves, the windows run too much up into the gutter. Plans are appended, but cannot be seen to any purpose.

1651, "Design for a Stained-glass Window," Mr. C. Hardgrave. A two-light window in memory of Trevithick; the central portions of each light represent Trevithick constructing a steam-engine,—a novel subject for stained glass, and treated with more success than might have been thought possible in that medium of illustration. The deeper tones of the window are concentrated on these centre portions, which are finished with canopy work of rich design; the upper and lower portions are occupied by canopy work of fourteenth-century character, with figures of angels holding scrolls with the inscription "Peace on earth, goodwill towards men," &c., words which are appropriate enough to the commemoration of a steam-engine inventor, in spite of Mr. Ruskin. At the foot is the inscription, "In memory of Richard Trevithick, born 13 April, 1771; died 22 April, 1833." Then why commemorate him in the style of the fourteenth century? Apart from this consideration, the window is a good piece of work.

1652, "Ceiling in Black and White, for Belton Hall," Mr. John H. Pollen. A comparison of this with No. 1642 seems to imply that the author is prepared to design in all styles, for these two are certainly as opposite in taste and feeling as could well be imagined. This is a slight pencil sketch showing a pretty design of Renaissance character; a wide border is marked off by a flat rib bearing a key pattern, and the border is filled up with central and angle panels with genii supporting shields and underlined with wreaths; a centre space is marked off by a flat rib designed on curved lines and bearing a guilloche pattern; a large shield with lion supporters occupies the centre, and medallion heads are placed in circular wreaths at the angles. The general effect is pretty and graceful, though the detail is not of the best school, and conventional foliage is used along with natural sprigs, which never looks in keeping.

1654, "Drawing-room Ingle, Holcombe Wood, Kent," Mr. J. Belcher. A capital little water-colour sketch bearing the signature of Mr. A. B. Pite; the ingle-nook, a very spacious one, opens under a large arch flanked by coupled red marble columns; warm tones predominate; perhaps more so than is likely to be altogether the case in the actual scene; but it is admirably harmonious in colour and handled with the feeling of an artist. The rib pattern in the ceiling is not quite true in perspective.

1656, "Birds-eye View of Proposed Royal Infirmary, Liverpool," Mr. A. Waterhouse, R.A. A view in watercolour, of a very extensive group of buildings in the plain style of architecture suitable for a building of this class. Three large longitudinal ward blocks run parallel at right angles to the street on which their ends abut, and with green lawns between them; some architectural effect is obtained on the ends towards the street by flanking towers and a large open arch and balcony in the upper story and a loggia in the lower; a cross block of buildings of communication apparently connects the main blocks at their upper ends; the centre one runs on into what is evidently the administration block behind; the side blocks, continued further apart, terminate each in a circular ward. So far one can pretty well read the plan from the drawing, but no plan is appended; and we are left in doubt whether the circular wards are for special cases, or merely as experiments in that form of ward, which few builders of hospitals as yet like to commit themselves to entirely.

1657, "Design for Commemorative Schools and Clock-tower," Mr. E. Hodkinson. A capital tinted drawing. The author of it is the draughtsman who is responsible, as mentioned before, for drawings representing the work of more than one other architect in the room. The tower has a good deal of originality, though we cannot say we like the effect of the twisted columns, with no capitals or finish of any kind, butting against a soffit; it is a whim, but not a happy one. As a clock-tower, the design rather fails in point from the fact that the clock face is the most insignificant feature in it, being merely sunk in a small square panel midway in the height of the tower, whereas a clock-tower should carry the clock stage as its most important feature. From the large amount of opening provided in the upper portion of the tower, it is perhaps intended to have an extensive carillon peal; this would be an excuse for the treatment of the design, which otherwise seems rather out of keeping with its alleged object.

1659, "Interior of proposed Church," Mr. W. Young. A large longitudinal section of a Gothic church, which claims notice as one of the very few examples of genuine architectural geometrical drawings exhibited, and is very carefully executed. It is unfortunately simply a reproduction of Gothic, not of the most refined detail.

1660, "Hôtel Bourgtherolde, Rouen," Mr. Ernest C. Lee. A good sketch in crayon, which has been reproduced in our pages. It might have claimed to be hung better than it is.

1661, "Houses at Chiswick-mall," Mr. John Belcher. A view of two or three houses in a very quiet style, suitable to the *genius loci*. Some years ago they would hardly have been called architecture, but we have changed all that.

1662, "Montreal General Hospital," Mr. Alexander Graham. A water-colour view hung too high to make anything of it, except that, for a hospital, it seems a somewhat picturesque group of buildings.

1664, "Entrance Gateway" of the hospital just named. A good massive piece of work, though we should have liked it better without the big stone spikes on the superstructure of the gateway; in fact, the whole of this structure over the gateway is rather "tremenjus," with its big scrolls, &c.; but, at all events, it is not timid. The drawing (water-colour) is a very good one.

1665, "House near Blackheath Hall," Mr. John Belcher. An interior showing a hall, wainscoted on the lower part, and with a ceiling panelled with massive moulded beams and intermediate ribs. A good pen drawing, but presenting nothing for special comment. By the same architect is,—

1666, "Morden Grange, Garden View." A bird's-eye view, in a rather sketchy pen drawing, of a very home-like old-fashioned-looking house, with a large extent of garden laid out with precise regularity, with those thick trimmed hedges which are the delight of artists like Mr. Fulleylove; a sun-dial and a fountain on the centre axis of the garden; a plot on the left laid out in walks crossing at the centre, which is marked by floral arches and a statue. The house is exceedingly simple, with a loggia with plain cylindrical columns in the middle of the ground story, forming a vestibule to the library, which opens on to the garden. The first-floor story is decorated with brick pilasters. The whole thing is in keeping, but looks so old-fashioned that one is in doubt whether it is a new house or an old one added to. A plan is appended. It is a pity the whole was not treated in a water-colour. The effect of the old-fashioned garden might have been charmingly given in a good water-colour; in the pen drawing the effect is lost, and it looks rather scratchy and straggling.

1667, "Snowdenham," Mr. Ralph Nevill. Two views and a plan of a picturesque house of the style which may be generally termed "Old English," though there are bits of actual Gothic in it, as a large "Tudor" window, a *porte-cochère* with buttresses and four-centred arches, and a terrace carried on a similar construction. The great merit of the building is that the picturesque arrangement of the windows arises naturally out of the features of the plan, and really expresses the arrangement of the interior. The very spacious hall, in comparison with the general scale of the house, is an instance of the growing tendency towards giving importance to this feature, even in houses of moderate size. The offices are conveniently arranged among themselves, but it is rather a long course from the kitchen to the dining-room.

1668, "Perspective View of Clyde Trust Buildings, Glasgow," Messrs. John Burnet, Son, & Campbell. This, which is a very good water-colour sketch, signed "Jules Lessore," may be taken along with No. 1681, "Proposed Extension to Clyde Trust Buildings, Glasgow, with Clock-tower to Harbour," this latter being a geometrical drawing in line, showing end and side elevations. We do not exactly make out how much of the building is new, except that the clock-tower manifestly is. The side elevation shows a building mostly of an Italian character, boldly treated, the lower half strongly rusticated. The principal entrance, under three large arches, is accentuated by an order and a pediment above. The tower is very boldly treated, somewhat Venetian in character, rising with strongly-marked vertical lines to a considerable height and there carrying a clock-stage with balconies (?) on heavy brackets under each clock-face, the object of which is not very apparent, unless we are supposed to go up into them to look at the clock. If the clock-face had been corbelled out it would have been more to the purpose. The tower is surmounted by an open octagonal lantern with a short stone spire, or rather conical roof, over it, and four bronze (apparently) seated figures occupy pedestals on the angles of the tower and fill up the line from square to octagon. The water-colour sketch, whether intentionally or not, does not quite tally with the elevations, and represents the tower with a considerable amount of batter, which is not discernible in the geometrical elevation, but which is an improvement to its effect. As shown in the perspective sketch, this appears a fine bold piece of design, solid and massive, and with no nonsense about it.

1670, "House at Elstree," Mr. E. J. May. A picturesque house of the "cottage architecture" type, with a plan appended, but hung too high to be seen. The bit stuck on at the end of the house, with two big chimneys rising from it, comes in rather awkwardly, and looks like a subsequent addition to the house.

1672, "All Saints' Vicarage, Plymouth," Mr. J. D. Sedding. A picturesque house, but rather too eccentric; it looks tumbled together; the small bays on the road-front, connected by a balcony and a roof, form a good feature. The house seems to have shaved off its eyebrows, having no projection or moulding worth the speaking of either at eaves or gables. This is

"characteristic" in a sense, but it does not add force to a building. Two small plans are appended; they cannot be well seen, however.

1673, "House at Tunbridge Wells," Mr. Jas. Neale. A beautifully-executed pen drawing, almost as soft and graduated in tints as a good engraving; the house, with an upper story of half-timber work seated on brick walls, and with strongly accentuated eaves, looks solid and at the same time picturesque; but it owes something of its effect to the well-executed background of the picture; the house and its surroundings make a good whole.

1674, "Design for a Town House," Mr. T. MacLaren. This we have already illustrated; it has been well hung and deserves its position in spite of the overpowering roofs with which the author has spoiled it (if it were a house for execution) both architecturally and practically. The centre pile of roof is as high from the main cornice to the peak as the cornice is from the plinth line, and in execution all this would be nearly wasted material and space, only available for badly-shaped and ill-lighted attics. But the lower portion of the house is dignified in design and very well drawn. The device of carrying the capitals of the upper wall columns past the architrave and frieze, and making them carry the cornice only is, however, hardly to be commended.

A RELIC AT AUSTIN-FRIARS.

A SUPPOSED relic of the former settlement of Mendicant Friars in Broad-street Ward has just come into view. It consists of a leaden coffin,—temporarily deposited, though not for exhibition there, in the Guildhall,—which has been discovered in a vault whilst making excavations for the rebuilding (Messrs. James & J. S. Edmeston, architects) of No. 57½, Old Broad-street, and No. 7, Austin Friars. The coffin, being of full size, is shaped to the body, and is of unusual width across the shoulders, though very narrow at the feet. It was found some 15 ft. below the surface, against what is possibly the northern chancel wall of the Friars' church. The amount of human remains turned up in course of the present works goes to show that here was the Friars' burial-ground. A church was erected here for the Augustines in 1253, by Humphrey de Bohun, Earl of Hereford and Essex, a grandson to their founder. The church's gilded spire was one of the very few for which London in those days could lay claim to distinction; and even by Stow's time, having survived St. Paul's, it had no superior. He dwells with evident delight upon the "Augustine Friars' church and churchyard; the entering thereunto by a south gate to the west porch, a very large church having a most fine spired steeple,—small, high, and straight. I have not seen the like." At the Dissolution King Henry VIII. bestowed the conventual house upon Sir William Paulet, Lord St. John of Basing, one of that sovereign's executors. Paulet converted the Friars' lodgings, cloister, and garden into a suitable residence, which continued in his family for scarcely more than half a century. On January 12th, 1550, Paulet was advanced Earl of Wiltshire, and further on October 12th, 1551, Marquess of Winchester. His new home, for a while known as Paulet or Winchester House, adjoined to that of his contemporary Sir Nicholas Throckmorton. Here he lived with his wife Elizabeth, daughter of his near neighbour Sir William Capel, ancestor of the Capels, Earls of Essex. By being, in his own words, a willow and not an oak, Paulet contrived to serve the Lord Treasurership of England to Edward VI. and his two successors on the throne: he died in his 98th year, on March 10th, 1572. His son and successor, John, sold the church monuments at Austin Friars for 100*l.*, as also the lead from off the roof. His great-grandson, William, fourth Marquess, having spent more than he could afford in various ways, including a magnificent reception of Queen Elizabeth at Basing, county Hants, was in 1602 fain to part with his property here for 4 500*l.* to Sir John Swinnerton (Lord Mayor 1612). He had for tenants Fulke Greville, Lord Brooke, and the Countess of Shrewsbury; and in Wilkinson's "Londina Illustrata" is quoted a letter under date September 23, 1602, from Greville to the Countess. He writes:—"I thought it my duty to give your ladyship notice, because both your house and my Lady of Warwick's are included in this bargain; and we, your poor neighbours, would think our dwellings desolate without you, and conceive your ladyship would not willingly become a tenant to such a fellow." The monuments alone testify to the pristine importance and accredited sanctity of the Friary. They comprised the tombs of Richard (Fitzalan), Earl of Surrey, whom King Richard II. beheaded in 1397; Humphrey de Bohun, King Edward I.'s god-father, who fought at Evesham; Edward, infant son of the Black Prince and Joan, his wife, the Fair Maid of Kent; Edmund Guy de Meric, Earl of St. Paul, who is said to have instigated the death of Thomas, Duke of Gloucester, in 1397; the tenth Earl of Arundel, executed in West Cheap, 1397; John de Vere, twelfth Earl of Oxford, beheaded on Tower-hill in 1461; many of the barons who fell in the Lancastrian defeat at Barnet Field, 1471; William, seventh Lord and first Marquess of Berkeley, with his wife Joan,—he died 14th of February, 1492; and Edward Stafford, Duke of Buckingham, who was beheaded through Wolsey's machinations, 1521. Some remains of the old Winchester House remained standing until about forty-five years since. Of the imposing block of three houses, styled Winchester House, in Old Broad-street, the front portion was demolished (together with other premises) in September, 1883, in pursuance of a scheme referred to in our columns of the 4th of August in that same year. The back premises had been removed in 1857. The site of Pinners' Hall, which stood hard by, was that of a Venetian glass factory that had been set up within the precincts of Austin Friars. Of that factory Howell, author of the Letters, was some time manager. After the suppression, Sir Francis Walsingham succeeded to the house here owned by a branch of the fraternity of the Papey, founded (1430) in honour of St. Charity and St. John the Evangelist at St. Augustine Papey in the Wall.

Before Humphrey de Bohun's death the nave of the Friars' Church was assigned "to the Germans . . . . for their church, to have their service in, for avoiding of all sects of Ana-Baptists, and such like,"—according to the passage in King Edward VI.'s diary, under date 1550, June 29. The "*Germani*" of the charter included certain Dutch and Flemish refugees, who united themselves with the original Protestant congregation of Jean à Lasco, the Polish exile's, church, that migrated from Embden in East Friesland. For a period, the Dutch or Flemish community shared this their "Temple du Seigneur Jesus" with the French refugees, who, subsequently migrating to St. Mary's Chapel, Threadneedle-street (pulled down in 1841), afterwards removed to the church, designed by Owen, in St. Martin's-le-Grand, which in its turn will soon have to make way for an extension of the General Post-office. After the fire of 1862, the valuable library of the Dutch Church community in Austin Friars, rich in MSS. and letters of Calvin, Peter Martyr, and others, Continental reformers, was, we understand, entrusted to the City Corporation for its better safety, and to render it more accessible to readers. It contained a copy of the Decalogue, attributed to the hand of Rubens.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE eleventh ordinary meeting of this Institute for the present session was held on Monday evening last, Mr. E. I'Anson, F.G.S. (President), in the chair.

Obituary.

Mr. Macvicar Anderson announced the decease of Sir Horace Jones, City Architect, and past-President of the Institute. Mr. Anderson's remarks and those of other gentlemen on this subject, will be found in another column of this week's *Builder*.

Mr. William H. White (Sec.) announced the death at Cannes, on the 7th inst., of M. Ruprich-Robert, an Hon. Corresponding Member of great distinction, after a long and painful illness. A notice would appear in the "*Journal* of Proceedings." The Council last heard from the deceased member in December last in a charming letter written from Cannes, at a time when he was very ill. He had been engaged for several years upon a well-known work on Norman architecture, which included notices of a great number of edifices erected in this country. That had been almost the work of his life, but he was also known as the author of several other works. M. Ruprich-Robert was Inspector General of Historical Monuments in France for a number of years, and was a Member of the Commission during the year 1844.

Drainage of the City and Palace of Westminster.

Mr. John Phillips, C.E., then read a paper on "The Drainage of the Palace and City of Westminster," of which the following is an abstract:—

Before entering upon a detailed description of the drainage of the Palace and City of Westminster, the author referred generally to the important question of town drainage,—a subject even now not so well understood and practised as it should be. One object should be, he said, in draining a house, a mansion, a village, or a town, to make the drains and sewers so that the sewage in them shall never stagnate at any part, but be constantly flowing with a self-cleansing velocity; and so that the air in them shall never stagnate at any part, but be always flowing, by fresh air passing into their lowest parts, and by foul air discharging from their highest parts into the stratum of the atmosphere above that in which we live and breathe.

Town drainage consists, first, of the comparatively clean surface and subsoil water; and, secondly, of soiled and used water containing organic matters called sewage. The combination of comparatively clean and of highly foul water in the same channels was established in London and its suburbs about the commencement of this century, at the time that water-supply by pipes to houses became general. A largely increased amount of water was used and was discharged into the old cesspools, and thence by overflow drains into the ditches, watercourses, and sewers, open and covered, which received the surface-water, and conveyed it into the natural streams and rivers. What was at first a makeshift or temporary expedient was continued, and became a system which has been extolled as the best course to pursue. The evils arising from this combination are, however, continually asserting themselves, and they become masters of the situation.

The two systems of drainage should, the author said, be kept separate by the provision of one set of drains for receiving the surface and subsoil water, and discharging it into the natural streams and rivers; and of a second set for receiving the sewage, and conveying it in self-cleansing drains as fast as it is produced to suitable and prepared agricultural land. This separate system was recommended by the author, Mr. Phillips, thirty-eight years ago, in his preliminary report on the drainage of the metropolis, and he advocated it now as the only effectual remedy for the evils arising from the combined system we have, up to the present, been pursuing. The sewage would in this system be conducted to reservoirs, and the suspended organic matters therein called sludge would be precipitated by lime and sulphates of alumina and iron. The sludge would be used by farmers, and dug or ploughed into the land the same as farm-yard manure. The liquid sewage would flow by irrigation upon, and find its way by filtration through, the land to the natural watercourses as a purified effluent, leaving its fertilising constituents in the soil on the way to be assimilated into growing crops.

The rain or surface water from the houses and streets would be carried away into the natural streams by glazed stoneware or fireclay pipes embedded in concrete, of diameters varying from 3 in. to 24 in. or more. The sewage from the houses would be carried away by glazed pipes of cast iron of 6 ft. to 9 ft. length, with inspection covers, curved junctions, and perfectly water-tight joints, laid with a proper fall on concrete, directly under the basement floors and paving, so as to be always accessible without opening the ground to get at them.

Where towns or districts are hilly or on sloping ground the necessary fall for the drains is easily obtained; but there are many towns and districts where the ground is low and flat, and where it is impossible to give the drains the necessary fall to be self-cleansing without going to excessive depths. Such districts, for instance, are Fulham, Chelsea, Pimlico, Westminster, and Poplar, on the north side of the Thames; and Battersea, Lambeth, Southwark, Bermondsey, and Deptford, on the south side. In such districts, however, the difficulty might easily be overcome by dividing the drains into sections, converging to receiving stations where the sewage might be lifted to sufficient altitudes

to ensure its flowing by gravitation to distant agricultural land, or down to the sea to be discharged therein from the level of the highest tides under low-water level. This mode of dealing with sewage is already in active operation at the Palace of Westminster, at Eastbourne, at Southampton, and at other places, where Shone's Hydro-Pneumatic system is employed in ejecting the sewage, with economical and completely successful results.

The author then proceeded to describe in detail the drainage of the Palace of Westminster as originally laid down by the architect of the building, and to point out the defects of the system employed, and the evils attendant upon the subsequent laying down of the main low-level sewer, through Westminster and Pimlico, by the Metropolitan Board of Works. The Palace stands, as is well known, beside the Thames. Its entire area, including Westminster Hall and Old Palace Yard, is about 14 acres. Its roofed, flagged, and paved surfaces, off which rain runs into the Palace drains, is about 10½ acres. The whole Palace might have been well and efficiently drained in the first instance if the simple expedient had been followed of keeping the rainwater drains separate from the sewage drains. The surface water might have been discharged direct into the Thames, and the sewage through a ventilated siphon-trap into a sewer in Bridge-street, at the south-west corner of old Westminster Bridge.

The manner in which the Palace was actually drained was as follows:—In 1838-39 the architect laid down a brick main sewer running from north to south along the centre of the Palace, into a main sewer then existing in Abingdon-street, the outlet being near the south-west corner of the Victoria Tower, and the head on the north side of the Speaker's-court. The length of the sewer was about 1,000 ft.; its size was 5 ft. 6 in. high by 3 ft. wide; its shape was a segment bottom, 6 in. deep, with upright sides and semicircular crown; and its fall was 1 in 923, or 1 in. in 78 ft. Into this sewer was conveyed, by numerous 9-in. and 12-in. and 2-ft. by 1-ft. brick drains rendered inside with cement, all the sewage produced in, and the rain falling on, the Palace. This sewer, owing to its excessive size, bad shape, little fall, and absence of any means of flushing it, accumulated sewage deposit to depths varying from 6 in. to 18 in., and from the decomposing sewage noxious gases continually escaped into the Palace. The sewer was occasionally cleansed, and additional traps were provided to keep down the smells, but all to no purpose.

At last, in October, 1846, the smells were everywhere so bad, that the author, who was then Chief Surveyor to the Westminster Commission of Sewers, was consulted by the architect of the building. He found upon examination that the main sewer was little better than an extended cesspool. By levelling he discovered that the sewer in Bridge-street, already mentioned, was 5 ft. lower than that in Abingdon-street. He therefore recommended the architect to take out the invert of the Palace sewer, and to put in a narrow deeply-curved invert with a reversed fall of 1 in 215 in place of it,—then to continue the sewer northward across the Speaker's Green into the sewer in Bridge-street. This recommendation the architect adopted and carried out, and in the end the sewer as altered, and the main drains connected therewith, became self-cleansing. They continued in this improved condition for a quarter of a century, until about fourteen years ago, when the main low-level sewer was put down through Westminster and Pimlico by the Metropolitan Board of Works. Since then the discharging level of the sewage from the Palace sewer, as well as from the sewers generally in Westminster and Pimlico,—instead of being lowered and the flow accelerated,—has been materially raised and the flow retarded; and the sewers themselves have been converted into sewage and rainfall reservoirs.

The principal cause of this state of affairs is the level at which this low-level sewer has been put in, namely, at least 5 ft. higher than it should be for properly draining the low flat districts through which it passes. When rain falls on the districts draining into it, the rain and sewage together sometimes fill it, and sometimes rise to 5 ft. and even 10 ft. above its crown, thus driving out the sewage gas, generated in the sewers, into the streets and houses. At such times the sewers in Westminster and Pimlico, as well as the basements of many houses there, are flooded to the hydraulic level; the foul drainage rises in the low-level sewer, and the sewage overflows into and pollutes the river. In dry weather the height to which the sewage formerly accumulated in the sewers, when the flap-valves on their outlets were tide-locked, has been materially and permanently raised by the height to which the sewage now flows in the low-level sewer. At the point where the Palace sewer joins the main low-level sewer, the level of the latter was so little below the former, that the 4-ft. depth of sewage flowing in the latter in dry weather formed a permanent head or dam, about 2 ft. 4 in. deep, against the outlet of the Palace sewer. This sewer for considerable length was thus converted into a permanently elongated sewage pond and sewage gas-retort; indeed, the flap-valve fixed near its outlet was recently found to be standing open and useless, and in rainy weather the accumulated drainage in the low-level sewer prevented that in the Palace sewer from discharging.

It is evident from the foregoing particulars and facts concerning the drainage of Westminster and Pimlico, that the insufficient depth and capacity of the main low-level sewer have materially injured, instead of benefited, the sewers in those districts, which, therefore, as regards their drainage, are in a far worse condition now than they were when they drained direct into the Thames. The real remedy for the evils which arise from the insufficient depth and capacity of this main sewer consists, in the author's opinion,—(1) In lowering its bottom from near the District Railway Station at Charing-cross to the western pumping-station at Chelsea, a depth of at least 5 ft., and in so doing altering its section from an 8 ft. circle to a 13 ft. by 8 ft. egg-shaped sewer; (2) In lifting the drainage near the railway station, a height of about 20 ft., by compressed air, having a pressure of about 10 lb. on the square inch above the pressure of the atmosphere, to be admitted into suitable ejectors placed underground near the low-level sewer, and discharging into the same sewer beyond; and (3) In thoroughly ventilating the sewer in sections from end to end by fresh-air down-cast and foul-air up-cast pipes, the latter discharging considerably above the house-tops. If this improvement were carried out, the main sewer would then drain the Westminster and Pimlico districts sanitarily, so far as the combined system will permit this to be done.

Mr. Phillips then stated that, in 1886, the Select Committee of the House of Commons appointed to consider the subject of the drainage of the Palace consulted him as to the best means of improving the same. His chief proposals were the following:—

Firstly.—That while the Metropolitan low-level sewer should continue to be the outfall for the Palace drains and sewers as at present, yet the arrangements for this should be such that neither rain nor flood water, nor sewage and sewage gas, should by any possibility come from the former into the latter.

Secondly.—That inside the Palace main sewer, a small egg-shaped sewer, having a fall of 1 in 212, be constructed of white glazed fire-bricks, and all existing drains be properly connected therewith.

Thirdly.—That at the lower end of the egg-shaped sewer, under the Speaker's Green, the sewage and rainfall of the Palace be continually discharged into the low-level sewer by three of Shone's pneumatic ejectors worked by compressed air produced by three gas engines,—only one ejector and one engine to be used in dry weather, and one or both of the remainder as required during wet weather.

Fourthly.—That the small egg-shaped sewer be ventilated by a fresh-air downcast pipe carried into its lower end, and a foul-air upcast pipe carried from its upper end into the ventilating shaft going to the top of the Victoria Tower.

These proposals were adopted by the Select Committee, and Mr. Isaac Shone, C.E., was appointed by the First Commissioner of Her Majesty's Office of Works the engineer to prepare the drawings and specification, and to superintend the work, and Mr. Phillips was then appointed by Mr. Shone as the resident engineer.

The work was eventually executed in the following manner:—A 12-in. cast-iron main drain, about 1,000 ft. in length, with a fall of about 1 in 212, was embedded in concrete along the bottom of the old main brick sewer. Two branch 9-in. cast-iron drains, and about 120 separate smaller drains, conduct all the sewage of, and rain falling on, the Palace and grounds, into the 12-in. main drain, which discharges into a receiver at the bottom of a sewage manhole under the Speaker's Green. From the side of the receiver a 12-in. cast-iron inlet-pipe is carried horizontally into the adjoining ejector chamber. This chamber is 29 ft. deep from the surface of the ground, and is 38 ft. long by 13 ft. 6 in. wide in the clear. In it are placed three cast-iron ejectors, one of which is capable of discharging 480 gallons, and the other two 335 gallons each, per minute. From the 12-in. inlet-pipe the sewage is delivered by branch 6-in. cast-iron pipes into the three ejectors. From the bottom of each ejector a 6-in. cast-iron pipe passes vertically upwards into a 12-in. cast-iron horizontal outlet-pipe. This pipe is carried through a solid brick dam, 8 ft. long, built in and entirely closing the old main sewer, and discharging beyond the dam into the outlet portion of this sewer communicating with the low-level sewer, about 1 ft. above the normal sewage flow in the latter sewer.

The compressed air for ejecting the rainfall and sewage from the ejectors is produced by Atkinson's differential gas engines placed in the basement, about 650 ft. distant from the ejector chamber. There are four of these engines of four-horse power each, though one of them is capable of compressing sufficient air for ejecting not only all the sewage under ordinary circumstances in dry weather, but a large amount of rainfall in addition. The compressed air is conducted from the engines by a 6-inch cast-iron pipe to three cylindrical wrought-iron receivers placed near the engine-room, and thence it is conveyed in 6-in. cast-iron pipes along the basement to a subway leading to the ejector chamber. From this pipe a 3-in. wrought-iron pipe conveys it into a small cast-iron horizontal cylinder fixed on the top of each ejector. The ingenious automatic arrangement by which the compressed air is conducted into the cylinders and thence into the ejectors, as well as the arrangements of the ball-valves inside the pipes for admitting and expelling the sewage, were described in detail by the author. The ejectors work, slowly or fast, according to the quantity of drainage coming to them, and they require no other attention than occasionally cleaning and oiling the joints, and the slide and main valves. The moment each ejection is completed the compressed air in the ejector is discharged therefrom by a 3-in. wrought-iron pipe connected with a 6-in. cast-iron main pipe, which leads into the ventilating shaft going to the top of the Clock Tower.

The height the drainage is ejected in dry weather is 11 ft. 6 in., and in wet weather, when the main low-level sewer is in flood, 15 ft. to 20 ft. The air-pressure for ejecting the drainage is maintained at 10 lb. per square inch above the atmospheric pressure, in order to meet immediate requirements for rainfall. About 5¼ lb. pressure is sufficient in dry weather to eject the sewage alone. The amount of sewage ejected in dry weather has been tested and found to average no more than 40 gallons per minute, so that a 6-in. pipe would really carry away all the sewage produced in the Palace. This, subtracted from 1,150 gallons, the total ejecting capacity of all three ejectors working together, leaves 1,110 gallons, which is, therefore, the quantity of rainfall they are capable of ejecting per minute, and which would come to them, from the ten acres and a half of roofed and paved surfaces draining from the Palace, at a rate of rainfall equal to ·28 in. in depth per hour, or 6·72 in. in depth per twenty-four hours.

Fresh air is admitted into the subway through two grated openings let into the footway in the Speaker's Green, and is thence conducted into the ejector chamber, and thence into the sewage manhole. From the manhole the air flows up the main 12-in. drain to near its upper end, whence it is conducted by a 12 in. pipe over a furnace in the large ventilating-shaft going from bottom to top of the Victoria Tower. The 9-in. main branch drain, which is carried under the basement along the west side of the Palace, is also completely ventilated by receiving fresh air into its top end, and discharging the foul air under the furnace at the bottom of the Clock Tower ventilating-shaft. The subway over the 12 in. main pipe receives fresh air from the surface down the old manholes, and

from an opening in the sewage manhole. The air in the subway flows along a 16-in. cast-iron pipe to the ventilating-shaft in the Clock Tower.

These new main drainage works have been in operation nearly six months, and are completely successful. They at once convey away all the sewage produced in the Palace, and the rain falling thereon. There is now no stagnant sewage or foul air in the drains, and consequently no noxious gases arise from them into the building.

The total cost of the works, including the four gas-engines, the three compressed air receivers, the pipings, and the three ejectors, has been a little over 11,500*l.*

Sir Robert Rawlinson, in opening the discussion, said he had been sorry to hear a good deal Mr. Phillips had said. Mr. Phillips laid down a theory with regard to combined drainage, which he (Sir Robert Rawlinson) protested against. He (the speaker) knew of no such system, and had never advocated such a thing. Taking London as it was now drained, there might be some ground for fault-finding, but, on the whole, there was very much to praise. London was an enormous area, and certainly if one had to sewer it *de novo* some points might be usefully considered. In an ideal system, every valley line and valley stream should be rigidly kept as a surface-water channel and as a rain-water outlet. Then the sewage proper should be intercepted from the valley lines, and carried down to some intercepting sewer. But to have laid down a system of duplicate sewers in London would have been a mischievous failure, and he was very glad it had never been carried out. In a place like London, where the river was tidal,—and where the main sewers which the Metropolitan Board had carried out would not take the volume of storm water,—there was the river to resort to, and the overflows of extremely diluted foul water would thus be conveyed away harmlessly. With regard to the drainage of the Houses of Parliament, Mr. Phillips had not said one word about all the preliminary reports made on the condition of things. Mr. Phillips knew well that he (the speaker) had had to do with it from the beginning to the end; that he had given evidence before the committee; and that, when asked how the sewage should be dealt with, he had said that if they determined to treat it in the way they had treated it there were three methods that could be followed,—by using gas-engines to lift it, or a common steam-engine, or a pneumatic ejector, worked from the existing boilers below the Houses of Parliament. He had not a word to say against the method Mr. Phillips had carried out, but he had a great deal to say against the allegation that the building was in the condition described. Let the officials of the House speak for themselves, and they would say that it was in no such condition. The cause was to be found outside, in the sewers put in Old Palace-yard, Bridge-street, &c., and their outlet ventilators. The sewers beneath the House were not perfect, certainly, but they could never have caused the amount of stench they were charged with causing, and that the officials would corroborate. Again, as to the cost, he could only pronounce it as monstrous that 11,000*l.* should have been expended upon the work. That amount would have sufficed to drain a population from beginning to end of 20,000 people. He could not understand how they had managed to get rid of the money.

Mr. William H. White (Sec.) next read two letters from Sir Henry Roscoe, Chairman of the Select Committee, speaking in terms of satisfaction as to the sewerage works lately carried out at the Houses of Parliament. A communication from Lieut.-Col. Jones, V.C., who was well known as taking great interest in sewage matters, and referring principally to the combined and separate systems, would be printed in the "Journal of Proceedings."

Mr. R. F. Grantham said he had had some experience in designing and carrying out the drainage of several towns. He had taken special interest in the separate system, and had carried it out, completely separating the sewerage from the rainfall. With regard to country and small towns, it was all very well to design on the separate system, because an opportunity was afforded of discharging the rainfall into the ditches, but where it had to be disposed of by a mechanical process it made a material difference in separating the rainfall from the sewage. He had had an opportunity of comparing the drainage of Romford with that of Slough, the drainage of the latter being carried out on the separate, and the former on the combined system. He found that in the case of Romford the sewage pumped was just four times as much in quantity as that pumped at Slough, showing the great advantage in such country towns of separating the rainfall from the sewage. To think of doing this, however, in a place like London was out of all reason. Mr. Phillips seemed rather to complain of the deficient fall of the Metropolitan main sewer, which he said was about 1 in 2,640 from Chelsea to Abbey Mills pumping station, and proposed to lower the sewer from Charing-cross to Chelsea. He would like to ask Mr. Phillips whether in doing that he would not very much diminish the fall, and make it worse than it now was? [Mr. Phillips: "The sewage would be lifted by ejectors."] In that case he wished to know what would be the size of the ejectors, and their capacity for lifting the sewage at Charing-cross? He agreed with Sir Robert Rawlinson that the expense of the works at the Houses of Parliament had been something tremendous, and that a population of from fifteen to twenty thousand could be sewered for the same amount.

Mr. Harry Newton said that by the method he advocated he followed a totally different principle in dealing with sewage, viz., in trying to exclude all air from it in every possible way, and thus preventing the formation of sewage gas.

Mr. Henry Dawson remarked that it appeared to him that, assuming Mr. Phillips's diagrams correctly represented the facts [Mr. Phillips: "They do"], the constantly charged sewer from the House of Commons must have been the main source of the mischief.

Mr. Edmund Woodthorpe proposed a vote of thanks to Mr. Phillips.

Mr. Henry Currey seconded the motion, adding that the Shone system had been introduced at Eastbourne with very happy effects. The great convenience of that system was that the outfall might be situated at one particular place, and the engine and machinery at another, as at Eastbourne, where it was a mile and a half away, and where it had been of the greatest possible benefit in lifting and getting rid of the sewage at all states of the tide.

After a few remarks by Mr. Atkinson on the mechanical details of the ejectors,

Professor Kerr said he was sorry that Mr. Phillips and Sir Robert Rawlinson should be of different opinions, but it must be a matter of congratulation at the same time that their friends the engineers differed as well as the architects did. The architectural profession was very much indebted to both those gentlemen. He did not wish to undervalue Sir Robert Rawlinson's labours for a moment, but Mr. Phillips deserved great credit for what he had done. They, as architects, were concerned with drainage chiefly within the walls of buildings, or not far beyond them, and they held the engineers responsible for all the mischief that occurred outside, under the streets, and so on. The sewer gas was the engineers',—it was their own peculiar and pet abomination (laughter), and architects looked to the engineers to get rid of it. Mr. Phillips seemed to imply that the architect of the Houses of Parliament was somewhat to blame in regard to the drainage, but it should be recollected that at that time of day architects did not know all that they now know [Sir Robert Rawlinson: "Nor did the engineers"]; and if Sir Charles Barry, whom they held in the greatest esteem, displayed some ignorance of what was now known, it was no discredit to him. It was some satisfaction to find that the engineers had at last got, in the form of the pneumatic injector, an apparatus that would enable them to get rid of the sewage whenever they happened to make a mistake, as they appeared to have done in the district of Westminster, in collecting the sewage at a level from which it could not escape. What Sir Robert Rawlinson had said was worthy of admiration as a common-sense way of dealing with the matter, viz., that if the engineers had to deal with London *de novo* they would preserve the water-courses for the water-flow, and confine their engineering to sewage proper. That could not now be done, but he supposed it was a fact that not only Westminster, but certain other districts of the metropolis, happened to lie below the level of convenient sewage disposal. Whether that could be remedied it was a matter not for the architects, but rather for the engineers, to decide. The engineers were responsible for it, and he hoped they would proceed with a better plan for dealing with the matter.

Mr. Phillips said he must be allowed to express his surprise at the remarks of Sir Robert Rawlinson.

Sir Robert Rawlinson said that he had not in any way intended to disparage Mr. Phillips. They were like the knights of old, and had been each looking at different sides of the same shield. He believed if he and Mr. Phillips could sit down together, there would be no difference between them as to what the latter had called the "separate" system of drainage. Mr. Phillips was far in advance of him in taking up the sewage question, and he (Sir Robert) had learned from him in his early days, but Mr. Phillips had been long lying fallow. He (the speaker), on the other hand, had been in the field, working the whole time, and that under every sort of aspect. He had laid out thirty years ago a system of sewers in West Ham, a district which was as flat as a pancake, with only 3 ft. fall in a mile, and it had worked satisfactorily from that day to this. The population, which was then 30,000, had risen to close upon 200,000, and though there had been additions, not a single yard of sewer had been altered.

The President, in putting the vote of thanks, remarked that Mr. Phillips was the oldest living pioneer of the modern science of drainage. The resolution was then put and carried.

Mr. Phillips, in replying, said he was quite satisfied that if he and Sir Robert Rawlinson were to talk the matter over they would soon agree. He did not advocate that the separate system should be carried out in London, but he affirmed that it was the proper system to be adopted in all new works, a conclusion he had come to nearly half a century ago. In reply to the question about the fall of the sewer, he believed the main low-level sewer had a fall of 2 ft. in the mile. He had suggested that the main low-level sewer should be lowered say 5 ft. The sewage, instead of standing in the sewers of Westminster as it now did, would flow easily away.

The President announced that the next meeting would be held on the 13th proximo, when a paper would be read by Mr. T. G. Jackson on "The Art of Dalmatia."

VISIT TO ST. THOMAS'S SEMINARY AND CHISWICK CHURCH.

ARCHITECTURAL ASSOCIATION.

THE ninth and last Saturday afternoon visit of the Architectural Association for this session was made on Saturday, the 21st inst. The first place visited was the St. Thomas's Seminary, Hammersmith. The members were met by Mr. Bentley, the architect, and the Bishop of Amycla, and conducted over the building, which is designed to accommodate fifty to sixty students, of which number some thirty are now in residence. It is built on the site of a religious house which existed there for many years, and when completed will comprise two complete quadrangles. Only one is at present finished, and in it are placed the dining-hall and kitchens, arranged on the ordinary college plan, and approached from a wide passage, or closed corridor. The common room is fitted up as a temporary library, and the students' rooms and those of the Principal and other officials occupy the remainder of the quadrangle. The chapel forms one side of the future quadrangle, next the Hammersmith-road, and the library, when built, will occupy the other.

The next place visited was Chiswick Church, where the rector, the Rev. Lawford Dale, met the party, and showed the church, which has been almost entirely rebuilt from the designs of Mr. Pearson. The seating is of polished teak; the choir-stalls and screens are of oak.

Surveying Class, Architectural Association.—The preliminary meeting to form the class for the study of land surveying and levelling will be held at 9, Conduit-street at 6·30 p.m. upon Tuesday next, May 31. Owing to the annual dinner being fixed for Thursday, June 9th, the field lesson announced in the Brown Book to be held that evening will in consequence be transferred to Friday, June 10.

THE LATE SIR HORACE JONES.

WE announce with much regret the death of Sir Horace Jones, the City Architect, which took place on Saturday last, May 21, at his residence, 30, Devonshire-place. He had only a day previously completed his sixty-eighth year, having been born on May 20, 1819. He leaves a widow and one child,—a daughter. According to the *City Press*, he was born in Sise-lane, Bucklersbury, where his father was a solicitor in practice, which was carried on after the father's death by the elder son, Alfred, who died about ten or eleven years ago. According to the same authority, Horace Jones was articled to Mr. John Wallen, architect and surveyor, in Aldermanbury. Subsequently he spent some time in studying the works of ancient architecture in Italy and Greece, the late Mr. George Vulliamy (Architect to the Metropolitan Board of Works), Professor Hayter Lewis, Mr. G. R. Burnell, and others being his companions. In the year 1846 he commenced practice as an architect at 16, Furnival's-inn, Holborn, and during a period of eighteen years designed and carried out numerous buildings of importance, such as the British and Irish Magnetic Telegraph Company's offices in Threadneedle-street, the Sovereign Assurance office in Piccadilly, the Royal Surrey Music Hall in the Surrey Zoological Gardens [both hall and gardens are now things of the past], Messrs. Marshall & Snelgrove's premises in Oxford-street, completed by Mr. Octavius Hansard after Mr. Jones's appointment to the City Architectship; Messrs. Hyam's premises in Oxford-street, Cardiff Town Hall, Caversham Park, and many other buildings, warehouses, schools, gentlemen's residences, &c. He also held the offices of Surveyor to the Tufnell Park Estate, the Duke of Buckingham's, the Barnard Estate, Bethnal Green, and others. A vacancy occurred in November, 1863, by the death of Mr. James B. Bunning, in the office of City Architect, and although it was then strongly felt by a large number of the Corporation that the office should not be continued as that of an Architect, and although the Officers and Clerks' Committee in the report adopted that view, and recommended that a "City Surveyor" should be appointed to advise on all matters relating to the City's Estates and public buildings,—architects to be obtained by competition or otherwise for new buildings,—yet it was finally decided by a narrow majority to re-establish the office on its former expensive footing, a right, however, being reserved to the Corporation to employ other architects if they saw fit; and accordingly on February 26th, 1864, out of eleven candidates Mr. Horace Jones was elected Architect and Surveyor to the Corporation of London.*

During the twenty-three years he held the office he designed and carried out a very large number of buildings, amongst the number being the Central Meat Market, in 1868. This was followed in 1875 by the adjoining Poultry and Provision Market, and in 1883 by the Fruit and Vegetable Market, subsequently turned into a fish market; and now a fourth market in Snow-hill is in course of construction. In the year 1871 the old Government Dockyard at Deptford was converted into a Foreign Cattle Market at a very considerable cost, and works are still going on there; in 1877, Billingsgate Market was entirely reconstructed and enlarged; in 1882, the new Leadenhall Market was built, and subsequent additions have been made, and are in course of execution. This makes a total of seven markets which have been carried out from designs of the late City Architect, besides extensive alterations and additions to the Cattle Market at Islington. In 1864 Mr. Jones completed the City Lunatic Asylum, Dartford, built from the designs of the late Mr. Bunning, and has since added several other buildings. In this year the design by Mr. Bunning for the new roof of the Guildhall was set aside, and that by the new Architect adopted as being more in accordance with archæological accuracy. Mr. Bunning's design was not without merit. The subsequent restorations of the masonry, windows, &c., were also carried out by Mr. Jones in 1872; the Library and Museum were added to Guildhall from his designs, and in 1884 the new Council Chamber. He also made several designs for remodelling other portions of the premises comprehended under the general head of Guildhall, but these have not reached the dignity of bricks and mortar.

* See *Builder* for that year, pp. 115, 137, 177.

He designed several police stations in the City,—Bishopsgate-street, with the hospital, in 1867; Seething-lane, 1870; Snow-hill, in 1875; Bridewell, in 1879; Cloak-lane, in 1886; besides police dwellings in Rose-alley, Bishopsgate-street. He also carried out, in 1867, upon a plan designed by Mr. Alfred Allen, chief assistant to Mr. Bunning, but with his own elevation, some artisans' dwellings in Farringdon-road, and, a few years later, the dwellings to the rear of Charterhouse-street, facing Saffron-hill. In conjunction with Sir Charles H. Gregory he designed a widening of London Bridge, but the scheme did not meet with the approval of Parliament, and so fell through. In 1887 he conceived the idea of a bascule bridge, to be erected below the Tower, and persistently advocated this idea, until at last, in 1885, the Corporation obtained powers to put the idea into execution, the result being the bridge now in course of construction, Mr. John Wolfe Barry being associated with the architect as engineer. Mr. Jones's last important work was the Guildhall School of Music on the Embankment, and one of his smallest the Keeper's Lodge, in Highgate Wood. So far we have been mainly indebted to the *City Press*, but to this list of works we must add the much-criticised "Temple Bar Memorial."

In 1882, Sir (then Mr.) Horace Jones was elected President of the Royal Institute of British Architects, and held that office for two years; but he was *not* knighted "on his retirement from that office," as the *Times* erroneously states in its short obituary notice. He was not knighted until last year, the honour being accorded (as we stated at the time*), "for his distinguished services to the City of London as Architect to the Corporation." Some years ago he read a paper† before the Royal Institute of British Architects describing some of his market buildings.

We append a list of those of his buildings which have been illustrated in our pages:—

Concert Hall, Surrey-gardens, vol. for 1856, p. 395; Sovereign Life Office, Piccadilly (corner of St. James's-street), 1857, p. 219; New Roof of the Guildhall, 1864, p. 829; Corporation Buildings, Farringdon-road (artisans' dwellings), 1865, p. 485; Smithfield Meat Market, 1867, p. 261; City Library and Museum, Guildhall, 1870, pp. 686-687; New Billingsgate Market (river front), 1874, p. 866; ditto interior view, 1875, p. 188; New London Central Poultry Market, 1875, p. 823; New Fruit and Vegetable Market (since used as a fish-market), Farringdon-road, 1880 (January to June), pp. 70-73; New Council Chamber, Guildhall (interior), 1883 (July to December), p. 728; the Guildhall School of Music, 1885 (July to December), pp. 322, 328; and the Tower Bridge, 1886 (July to December), pp. 24, 25.

Sir Horace Jones had for the past few years held high office in the Masonic body as Grand Superintendent of Works.

At the meeting of the Royal Institute of British Architects on Monday evening, the President (Mr. E. I'Anson) in the chair,

Mr. J. Macvicar Anderson (Hon. Sec.) addressing the meeting, said:—We cannot pass through life without occasionally having painful as well as agreeable duties to discharge. It falls to my lot to-night to discharge the painful duty of intimating to you officially the loss of one who has occupied the position of President of this Institute, and who was one of our most distinguished members. The official intimation of the loss we have sustained is contained in the following letter we have received from Mr. Octavius Hansard:—

"30, Devonshire-place, W., May 22, 1887.

Dear Mr. White,—With deep regret, at the request of Lady Jones, I have to inform you that my old friend, Sir Horace Jones, the City Architect, and Past President of the Royal Institute of British Architects, departed this life last evening. Will you please to lay this before the Council to-morrow evening, and to announce the same to the General Meeting?—I am, yours truly,

OCTAVIUS HANSARD.

W. H. White, Esq., Sec., R.I.B.A."

The familiar presence and genial face of Sir Horace Jones are too fresh, I think, in the memories of all present for us to realise that so recently as on Saturday last the silver cord was broken, and that within the next day or two the mourners will go about the streets. Yet so it is; a career of great public usefulness and utility has thus been cut short. This is not the time, nor the occasion, to enter on a historical notice of his life or works; it will fall to abler hands than mine to do that,—but I should be sorry, if on this the first occasion on which we are met after the death of our friend, we did not express our appreciation of the character of him who has gone, and our deep regret at the loss the Institute has thus sustained. The Council, at their meeting to-day, passed a vote of condolence with Lady Jones, which will be duly communicated to her, and no doubt it will be the wish of the Institute to pass a similar vote that it may go not simply from the Council, but from the general body of the members. The career of Sir Horace Jones, especially to the younger members of the profession, offers the opportunity of drawing lessons of great utility. He was an example of determined perseverance and industry, showing what these accomplishments will produce without external aid. Commencing life at twenty-two he devoted the small patrimony to which he had succeeded to improving his professional knowledge by travelling abroad, in conjunction, I think, with Mr. Ewan Christian and Professor Hayter Lewis. I have often heard both these gentlemen speak of the great pleasure they experienced in the company of Sir Horace Jones on that occasion. On the completion of his travels, and on returning home, he entered for the competition for Cardiff Town-hall, which he won. That was his first work, and while engaged at Cardiff he made the acquaintance of Mr. Crawshay, the great ironmaster, who, his house near Reading happening to be burnt shortly afterwards, applied to young Jones (as he then was) to meet him on the spot. He did so, and Mr. Crawshay desired him to rebuild his mansion on an entirely new site. There and then Mr. Jones advised him to do nothing of the kind, but showed Mr. Crawshay how he could save many thousands of pounds by rebuilding the house on its old foundations. He was appointed architect to carry out the work, which he did successfully, and this was the beginning of a career which to all of us has been so familiar. It is not necessary to refer to his later works. They are works of great utility, and it is much to be feared that the anxiety connected with some of his more recent works may have tended in some degree to expedite his death. I was favoured to-day with the sight of a letter addressed by an old friend of Sir Horace Jones to Mr. Octavius Hansard, another old friend, and by his permission I am allowed to make use of it, because it struck me as being so remarkably well expressed that I would venture to read it to you. The writer says:—

"His professional ability, his strong common sense, his humour, his social geniality, and his varied information, made him a charming companion. His high honour and manly character commanded entire respect, while his warm and loyal heart engaged the affection of those whom he honoured with his friendship. . . . . He will leave a worthy monument of his professional honour in the public works he had designed and constructed, and of his personal character in the affectionate regrets of many friends."

Personally, I concur most heartily in the expressions contained in that letter, and I am quite sure they will be reciprocated by every member of the Institute (hear, hear).

Mr. Charles Fowler, who spoke with considerable emotion, said,—As a very old friend of Sir Horace Jones, I venture to propose that a letter of condolence be addressed not only from the Council, but from the Institute generally, to Lady Jones on this sad occasion. I do not wish to add much, for it is quite unnecessary that I should do so, to what the Hon. Secretary has said; indeed, I cannot trust myself to say anything further. I am quite sure that all the members of the Institute who had the pleasure of knowing our old friend appreciated thoroughly his straightforward, honourable, and honest character, his good nature, and his warm kindness in endeavouring to help forward the interests of any of the younger members of the profession who might apply to him. His death has created a vacancy which will not be very soon filled.

Mr. Henry Dawson.—I think perhaps it may be considered appropriate that I should take the opportunity of seconding the proposition, as I was a strong competitor of our old friend at the time when he applied for the post of Architect to the Corporation of the City of London, inasmuch as I had the privilege of being third on the final list. I have always felt a very considerable satisfaction in my own mind that I did what I could,—seeing that I was not going to be the successful candidate,—to aid in the election of

* See *Builder*, August 7, 1886, p. 190.
† See *Builder*, vol. for 1878, pp. 34, 89.

our late friend to the post. Since that date, as an old practitioner in the City, and having on many occasions had the happiness of t ansacting business with Sir Horace Jones, I had the means of knowing him very intimately indeed, and I can therefore agree with what Mr. Anderson has said that his career is eminently one that is fitted to teach good lessons both to the old and young members of the profession, and more especially, of course, to the latter. Of all the energetic and industrious men I have known, I do not think any could surpass Sir Horace Jones, and I can say, from my own experience, that a more straightforward and honourable man I certainly never have had the privilege of knowing. Even when opposed to one, which on some questions he was to me, he was ever determined to do that which was right to both friend and opponent. I think he was a most estimable example, and I have had to express the feeling to many clients, who thought I was very partial towards my opponent, that their case would never be damaged by the admirable manner in which he treated it, always meeting, as he did, with a due regard to the real merits of the question, any representations on the part of the other side. I should like to second the vote of condolence with Lady Jones, and I take it that we shall record our sense of the estimable character of the man whom it has pleased God to take from us, and I trust that those who remain behind will strive to imitate the qualities which he so well displayed.

The President, in putting the vote to the meeting, intimated that he, with the Vice-presidents and members of the Council, had decided to attend the funeral, which was arranged to take place on Friday at Norwood Cemetery, at half-past eleven (leaving 30, Devonshire-place, W., at ten o'clock). The vote was then passed by the meeting.

OBITUARY.

Mr. John Green Hall, F.R.I.B.A.—We hear with much regret of the death of this gentleman, who had filled the office of City Surveyor of Canterbury for the last twenty-one years. He was about 52 years of age. According to the *Canterbury Press*, he recently underwent an operation for fistula, which was successfully performed, and, although it was followed by extreme prostration, it was thought that the patient was likely to recover. Subsequent complications, however, arose, and resulted finally in blood poisoning, from which, on the 17th inst., death ensued. Mr. Hall was a native of Hampshire, and went to Canterbury on receiving the appointment of City Surveyor in 1866, when he was elected out of over sixty candidates. He was a Fellow of the Royal Institute of British Architects and a Civil Engineer. His chief architectural works in Canterbury were the cemetery buildings, the Roman Catholic Chapel, the Presbyterian Chapel, and the London and County Bank. The new bank buildings now being erected for Messrs. Hammond & Co. from his designs and plans are spoken of as being probably his most important architectural effort in the neighbourhood of Canterbury. He had, however, been architect of churches and other buildings in Yorkshire and elsewhere. His plans for the sewage works at Canterbury, and the system of filtration which he adopted possessed marked originality; and although the site of the works presented many difficulties, the sewage farm has more than realised the expectations formed of it. Mr. Hall always looked upon this as his best professional achievement. He was incessant in his attention to the works until the experience of the first years had proved the success of the system. In his private capacity he was respected and esteemed by a wide circle of friends. The interment took place in the Canterbury Cemetery on the 20th inst., the funeral being attended by the members of the Corporation and a large number of the leading citizens.

Mr. John Davis.—One of the oldest of the Birmingham architects, Mr. John Davis, departed this life on the 18th inst., after a somewhat protracted illness. Mr. Davis was articled to Messrs. Drury & Bateman, of Birmingham, and commenced practice at Chester at an early age. For some time he was in partnership with Mr. Hornblower,—now of Liverpool. Not meeting with much encouragement at Chester he settled in Birmingham, where at one period he had a somewhat extensive practice. He was architect of several churches and schools at Birmingham and Kidderminster, several mansions near Birmingham, and numerous smaller works. He was enthusiastically fond of Gothic architecture. Many years ago he made, for publication, some beautiful measured drawings of Temple-Balsall Chapel, Warwickshire. Mr. Davis was verging on his seventieth year. He leaves a widow and large family, and was highly esteemed by all who knew him. Two of his sons are established as architects, viz., Mr. J. Statham Davis and Mr. James Davis, at Birmingham and Walsall respectively.

THE ARTISTS' BENEVOLENT FUND.

The seventy-eighth anniversary festival of this Fund was held at the Freemasons' Tavern on Wednesday night, Mr. L. Alma-Tadema, R.A., presiding. The Fund was established in 1810, received in 1827 a charter of incorporation from George IV., and now enjoys the patronage and support of the Queen. It consists of two divisions,—the Artists' Annuity Fund, raised and wholly supported by the contributions of its members, for their own relief in sickness and old age, and which neither asks for nor receives public support; and secondly the Artists' Benevolent Fund, which is purely charitable, having for its object exclusively the relief of the widows and orphans of members of the Annuity Fund who are left in need. The latter branch is supported by the donations and subscriptions of patrons of the fine arts, and annual subscriptions of the members of the Annuity Fund. During the past year forty-eight widows and seventeen orphans have received annuities amounting in the whole to 1,076*l*. Amongst the company, which included ladies, were:—Sir F. Leighton, P.R.A., Sir J. D. Linton, P.R.I., Sir Rutherford Alcock, Mr. Lumb Stocks, R.A., Mr. Marcus Stone, R.A., Mr. C. B. Birch, A.R.A., Mr. John Collier, Mr. John Absolon, R.I., Mr. W. Cave Thomas, Mr. Geo. Godwin, F.R.S., and Mr. C. Cattermole, R.I.

The Chairman, in proposing "Prosperity to the Artists' Benevolent Fund," said that it was the duty of those in a position to do so to help their poor and distressed brethren in art, and then made an appeal to all who had the interest of the Fund at heart to avail themselves of this annual opportunity of helping it and maintaining its prosperity.

Mr. George Godwin, F.R.S., Vice-President, who responded, said it was a mistake to suppose that this was merely a benefit society, for it assisted widows and orphans, and enabled young artists starting on a most precarious profession to provide for a rainy day. In conclusion, Mr. Godwin proposed the health of the Chairman.

The Chairman briefly replied, and next proposed "The Royal Academy," coupled with the name of the President.

Sir F. Leighton, in responding, said that he fully appreciated the excellent work done by Artists' Benevolent Fund. It was impossible that an artist should fail to regard with respect and esteem the work of a body which, while it administered to wants of which only an artist could measure the full extent and the bitterness, at the same time succoured only the provident and the survivors of the provident, and by that means offered an incentive to prudence and thrift. A distinctive feature of the Artists' Benevolent Fund was that in dispensing aid to widows and orphans it recognised only the survivors of those who, during their life time, had, in however small a degree, contributed to the fund; so that it might be said that a moral influence as well as material aid emanated from the Institution (hear).

The Hon. John Collier proposed "The Royal Society of Painters in Water-Colours and the Royal Institute of Painters in Water-Colours," the toast being acknowledged by Sir J. D. Linton, who, in return, gave "The President and Members of the Artists' Annuity Fund," for which Mr. T. H. Maguire responded.

Other toasts followed, and subscriptions and donations amounting to about 500*l*. were announced.

The National Liberal Club.—Referring to our description of the new Clubhouse for the National Liberal Club in last week's *Builder*, we are asked to mention that the Westmoreland Green slates used were supplied from the Tilberthwaite Green Slate Quarries, Coniston.

Illustrations.

AMERICAN HOUSE ARCHITECTURE.

We give three examples from photographs of modern street and house architecture in the States. The residence, designed by Messrs. Cobb & Frost, for the lake shore at Chicago, is a house that in regard to its general style and architectural treatment might as well have been met with in England, and perhaps is not what would command very great admiration on whichever side of the water it was met with; the style is rather coarse and heavy, but it is a large and important dwelling-house, with a certain dignity and massiveness about it. The front of the Club-house at St. Louis, by Messrs. Peabody & Stearns, is an example of the Richardsonian order of architecture, Mr. Richardson having apparently succeeded in creating a style which others are willing to follow, just as Mr. Norman Shaw has done in England. The business premises designed by Messrs. Cabot & Chandler show something resembling recent architectural fashion in England, in the treatment of the projecting bays, but with a difference of detail.

SUNNINGDALE CHURCH.

This church seems to have been built about fifty years ago. It consisted of a plain oblong with some excrescence at the east end. A new chancel was added by Mr. Street some time since, together with a north chancel aisle and a vestry.

The church is now to be completed by the erection of a nave, aisles, and transepts, with a central tower and spire, at a cost of about 7,000*l*.

Mr. J. Oldrid Scott, F.S.A., is the architect, and Messrs. Norris & Son, of Sunningdale, the contractors. The work has just been begun, and it is expected that the first stone will be laid by the Prince of Wales early in June.

SKETCHES IN SHROPSHIRE.

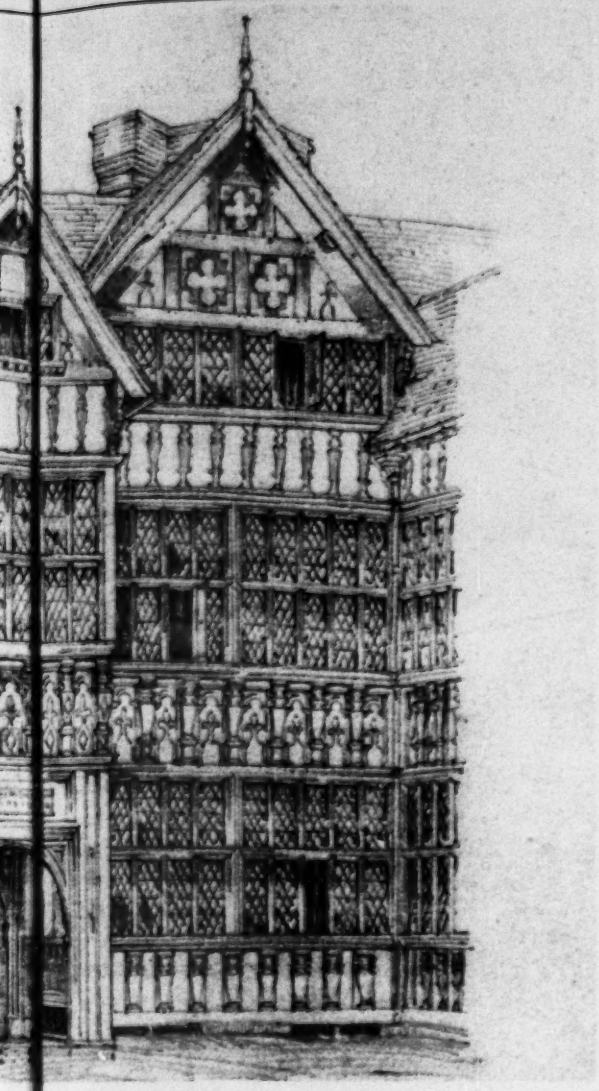
For the seeker after English Domestic work in all its developments, from Norman Border keeps to fantastic timber houses of the sixteenth century, there is no happier hunting-ground than Shropshire. Remoteness from any of the busy centres has kept it out of reach of the tide of "modern improvements." The examples illustrated this week are all from the Welsh Border district.

Stokesay Castle, of which a north-west view and the interior of the great hall are given, is the most complete thirteenth-century dwelling-house left in England. Originally simply a moated residence, it was later on made more defensible by the addition of two towers, one still remaining, the other pulled down and replaced by the projecting half-timber solar room seen at the further end on the sketch. The traceried windows, with gablets over, light the great hall. Those on the courtyard side are similar. One of the rooms has a beautiful oak chimneypiece and wall panelling of the sixteenth century. At that time the lodge also was added, and a sketch is given of its central gateway on the side next the courtyard. Another similar gateway, from the Guildhall at Shrewsbury, illustrated, is interesting as showing the different treatment of the same subject, evidently, from the likeness of detail, by the same designer.

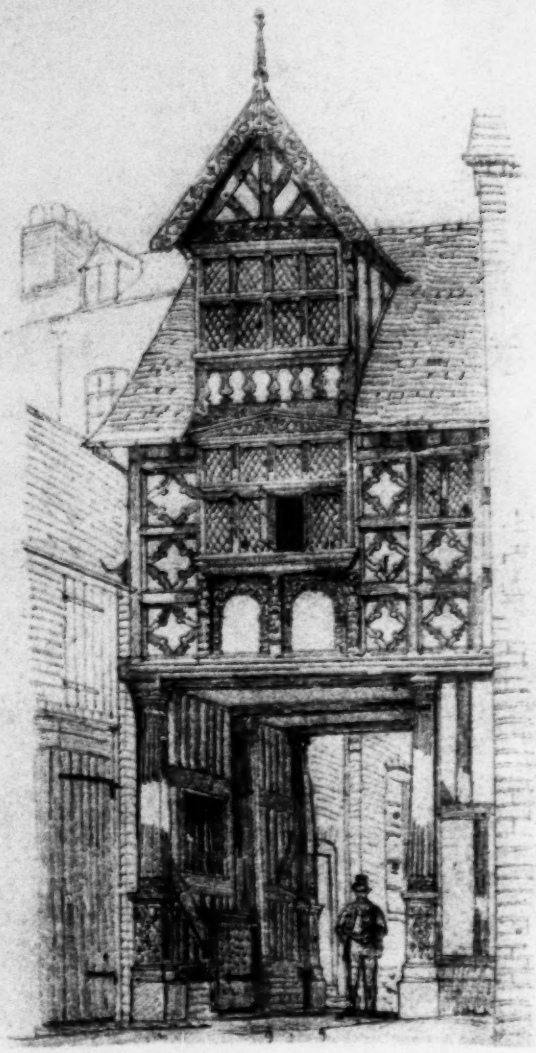
Park Hall, near Oswestry, is a fine example of a late sixteenth-century manor-house. It is ⊓-shaped on plan, the porch and gables shown occupying the centre. The end wings have wider gables of the same pitch, and similarly treated to those at the porch, and the same ornamental pilasters and diapering are continuous along the whole front.

Henry D. Walton.

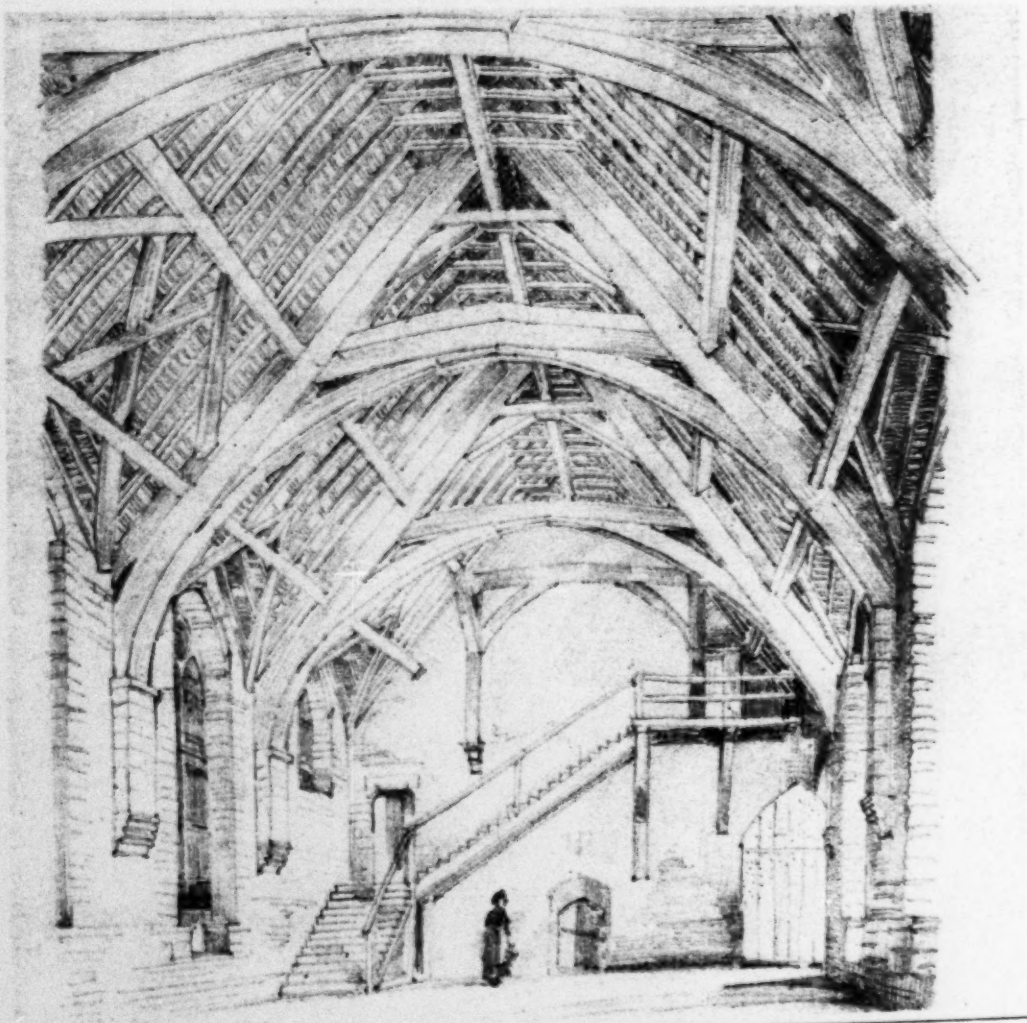
Cart Horse Parade.—This year the parade of cart horses, which was very successful last year, will be held at Olympia, Kensington, on Whit-Monday. In the great arena all the selected teams will march past in procession, and eventually receive their prizes at the hands of the Baroness Burdett-Coutts, together with diplomas from the Royal Society for the Prevention of Cruelty to Animals. There will also be a show of tradesmen's horses. Shows such as these no doubt tend to make carters and vanmen take a kind and intelligent interest in their animals.



RANCE PORCH, PARK HALL.



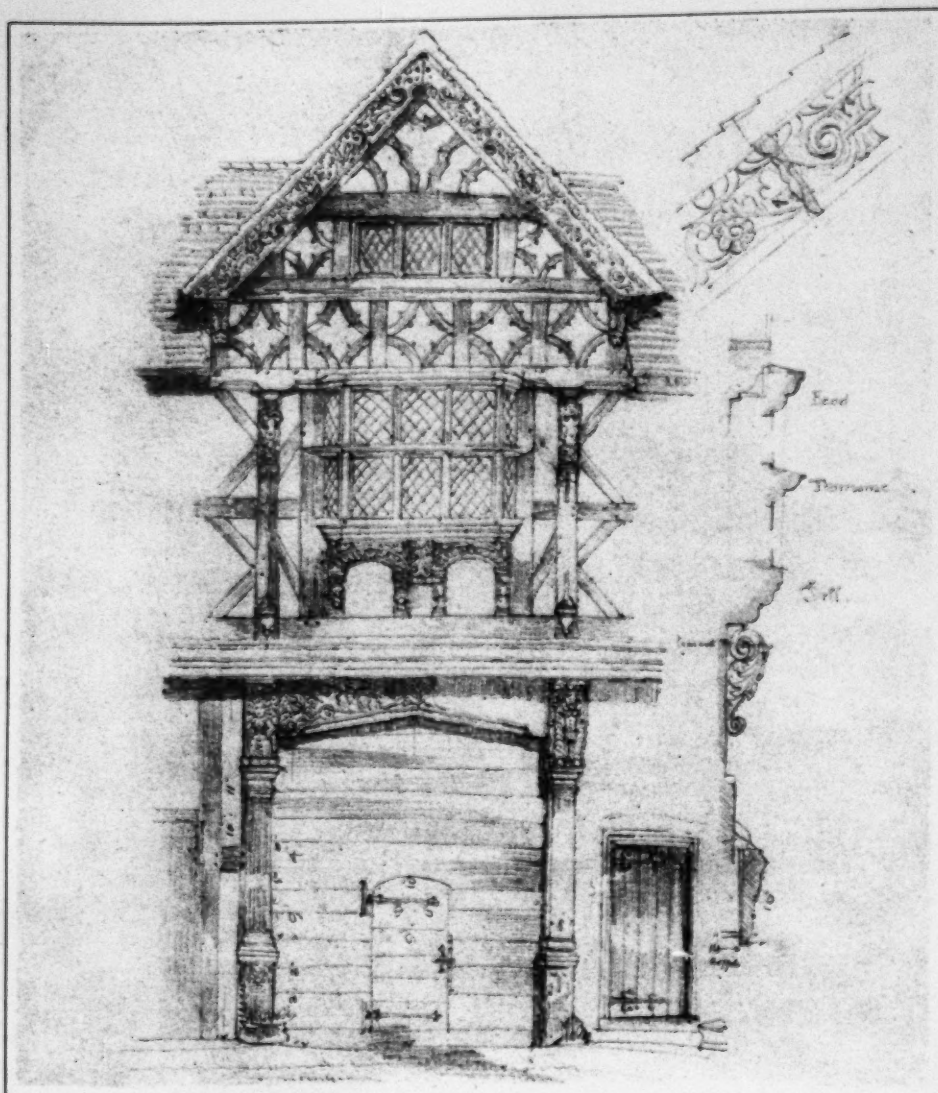
ENTRANCE TO THE OLD GUILDHALL, SHREWSBURY.



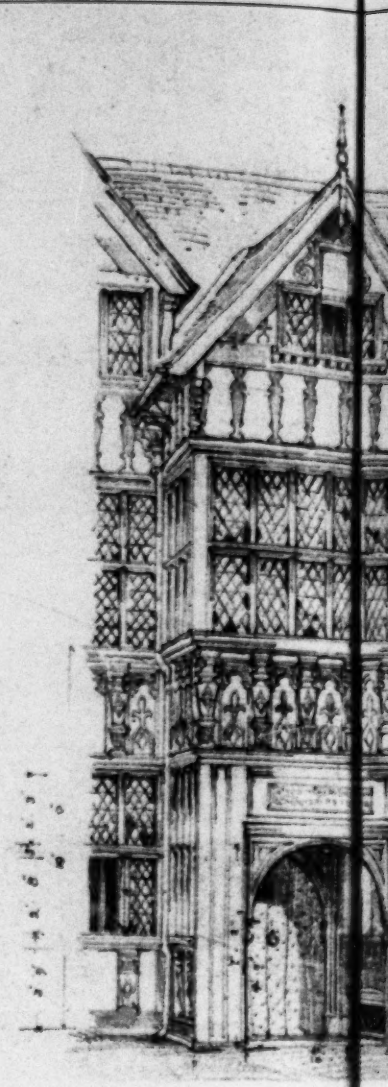
INTERIOR OF THE HALL, STOKESAY CASTLE.

PHOTO. SPRAGUE & CO. 62, MARTINS LANE, CANNON ST. LONDON, E.C.

BY MR. H. D. WALTON, PUGIN STUDENT, 1886.



ENTRANCE TO THE COURTYARD, STOKESAY CASTLE.



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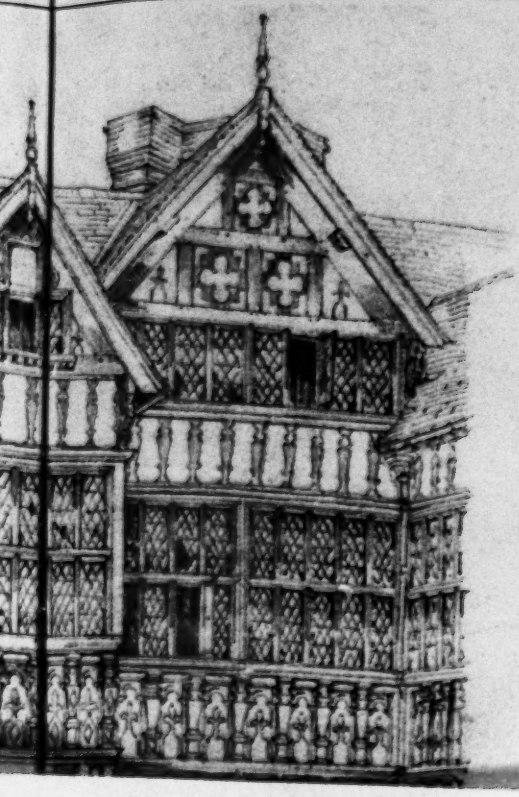

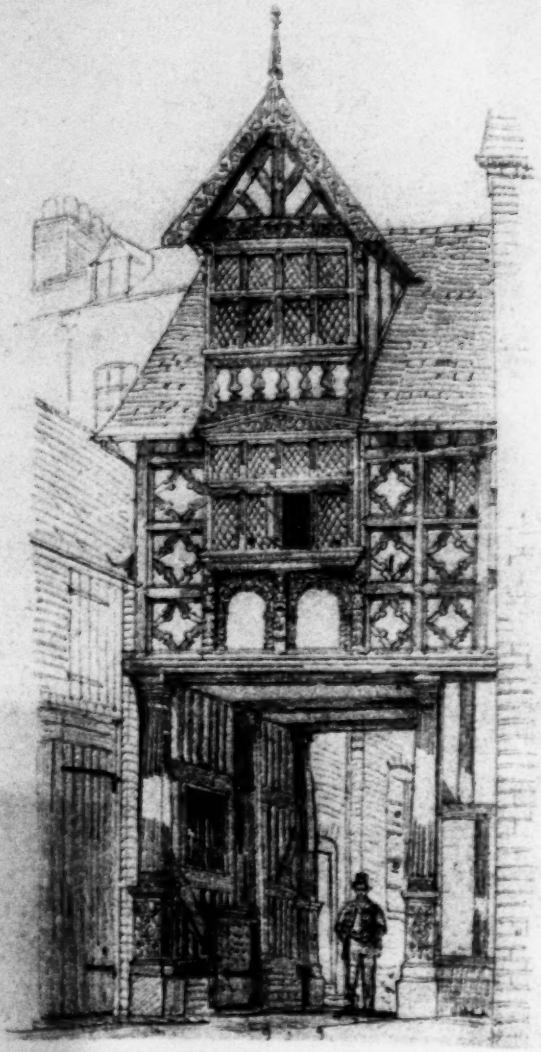

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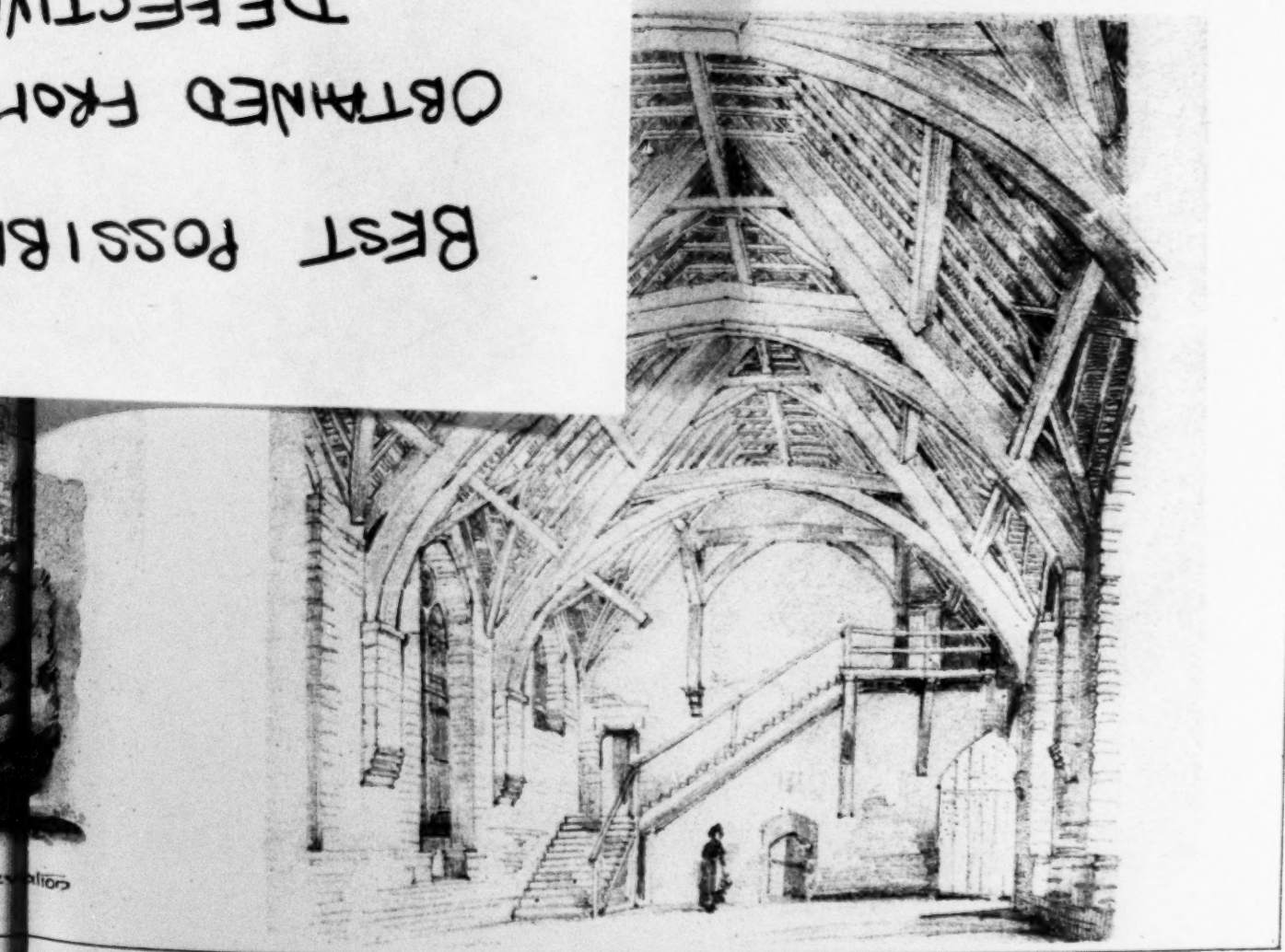
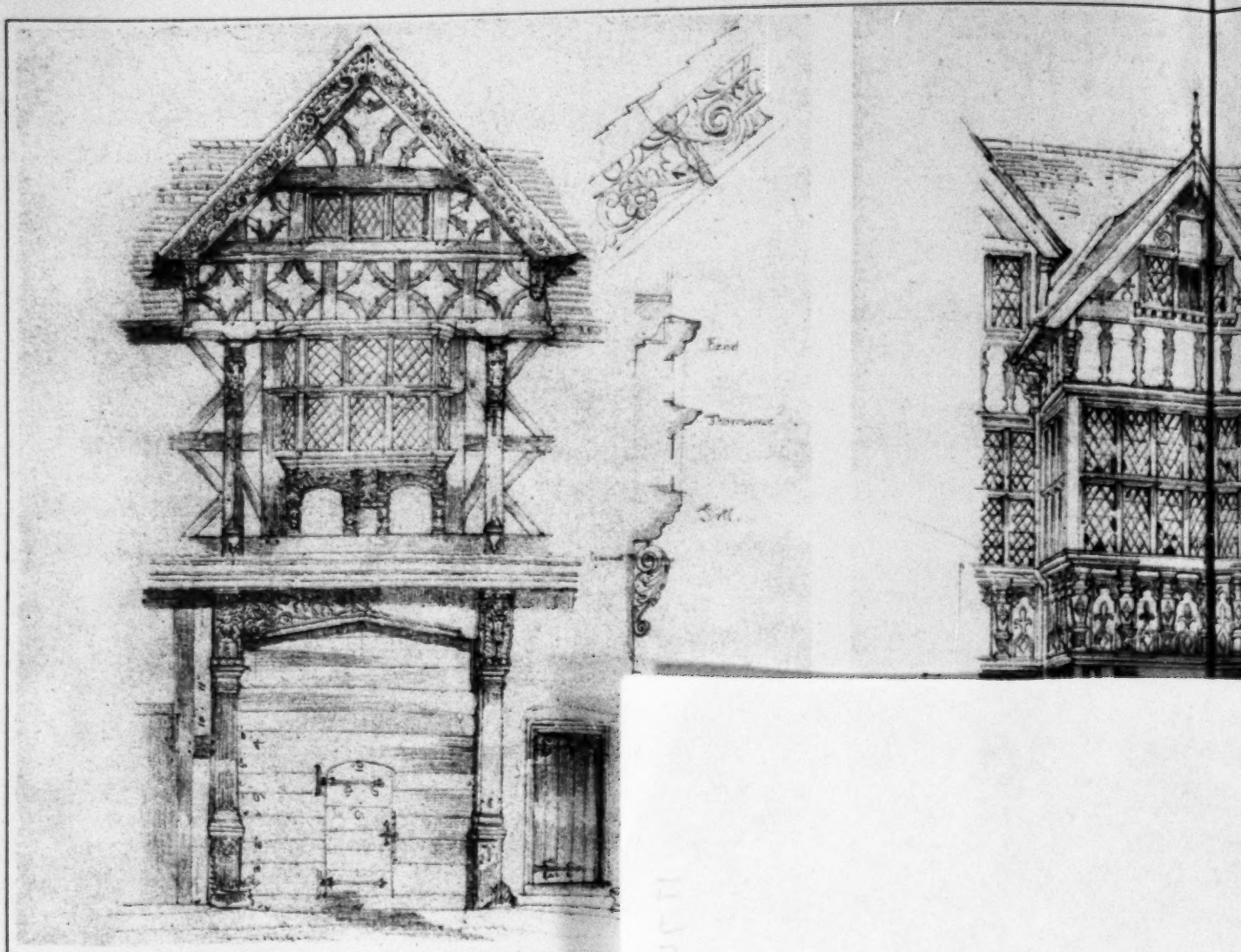


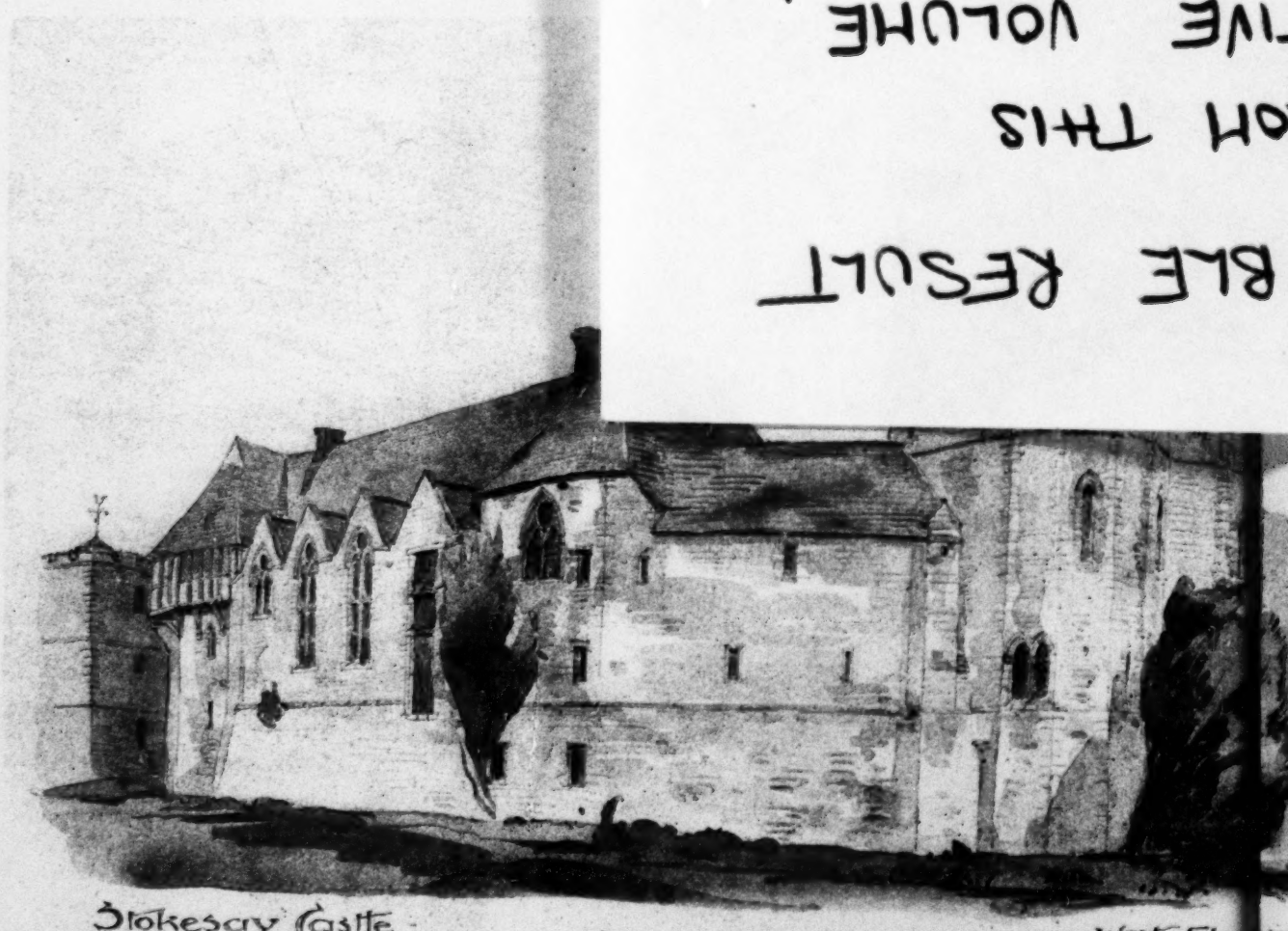
INTERIOR OF THE HALL, STOKESAY CASTLE.

THE PHOTO. SPRAGUE & CO. 22, MARYLAND LANE, CANNON ST. LONDON E.C.

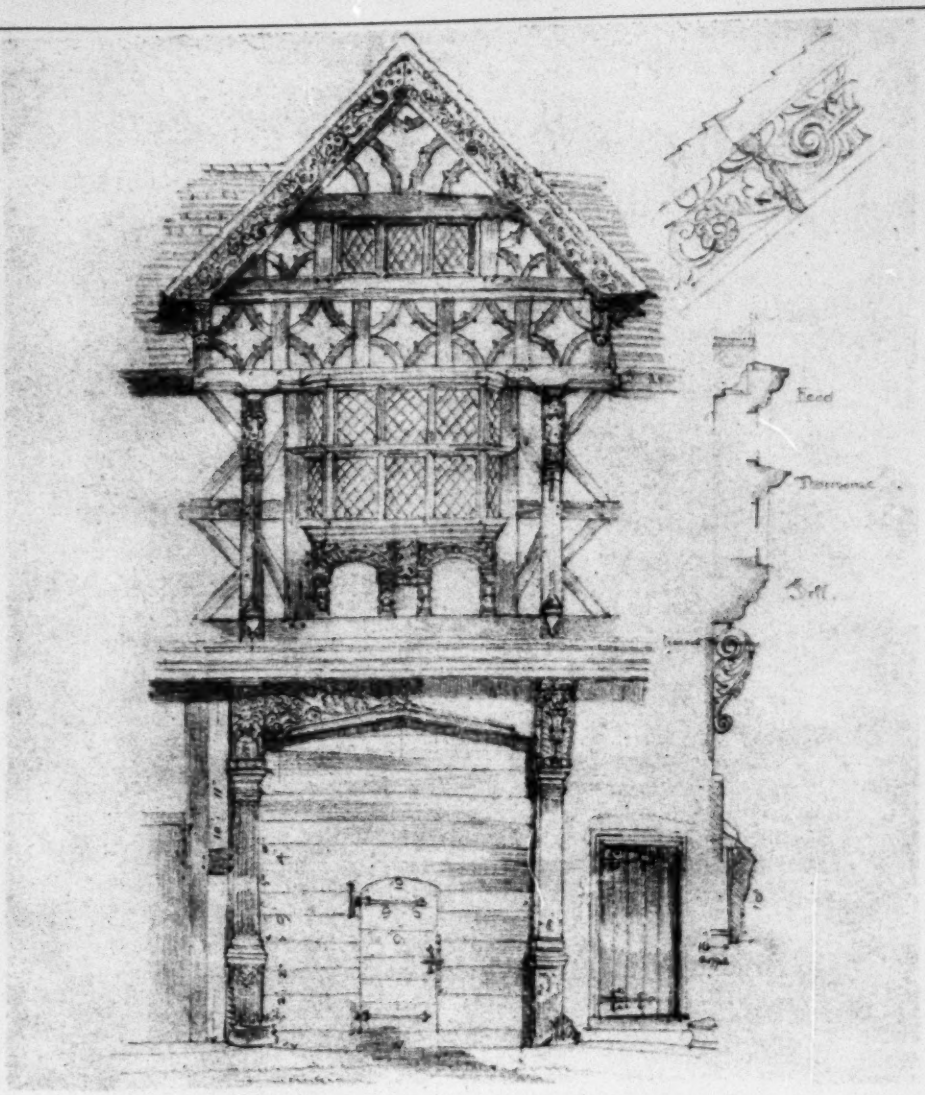
R. H. D. WALTON, PUGIN STUDENT, 1886.



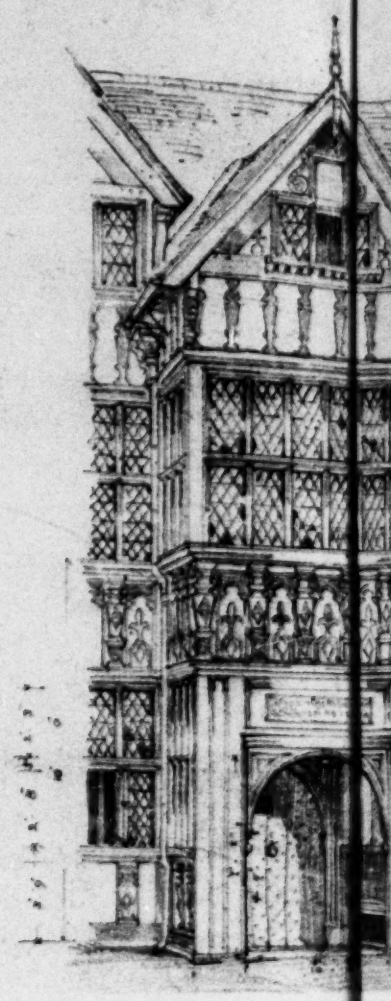
ENTRANCE TO THE COURTYARD, STOKESAY CASTL



SKETCHES IN SHROPSHIRE—By R. H



ENTRANCE TO THE COURTYARD, STOKESAY CASTLE.



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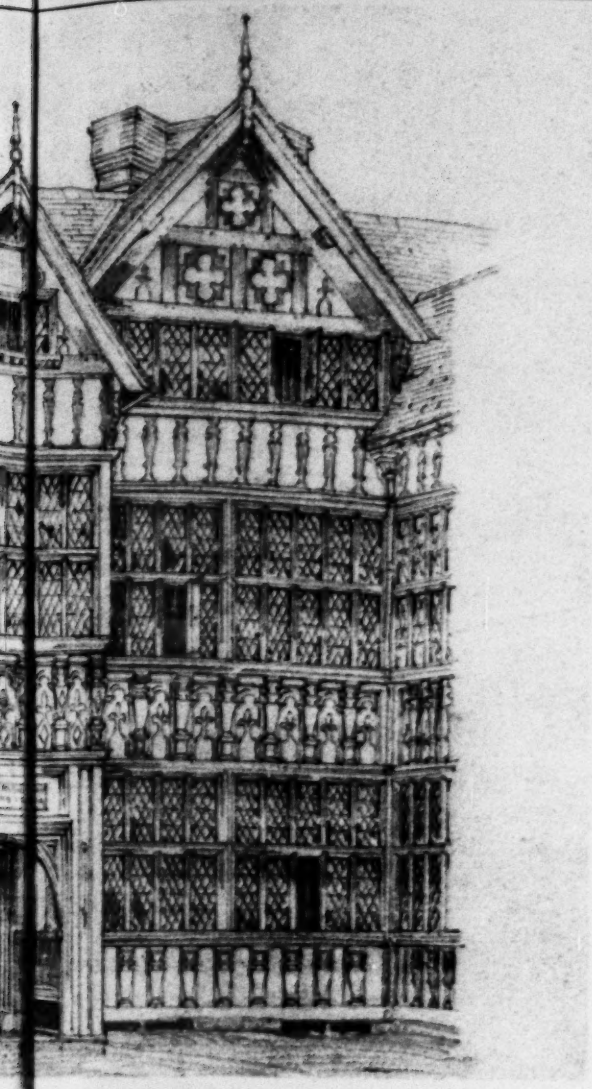
SKETCHES IN SHROPSHIRE—By



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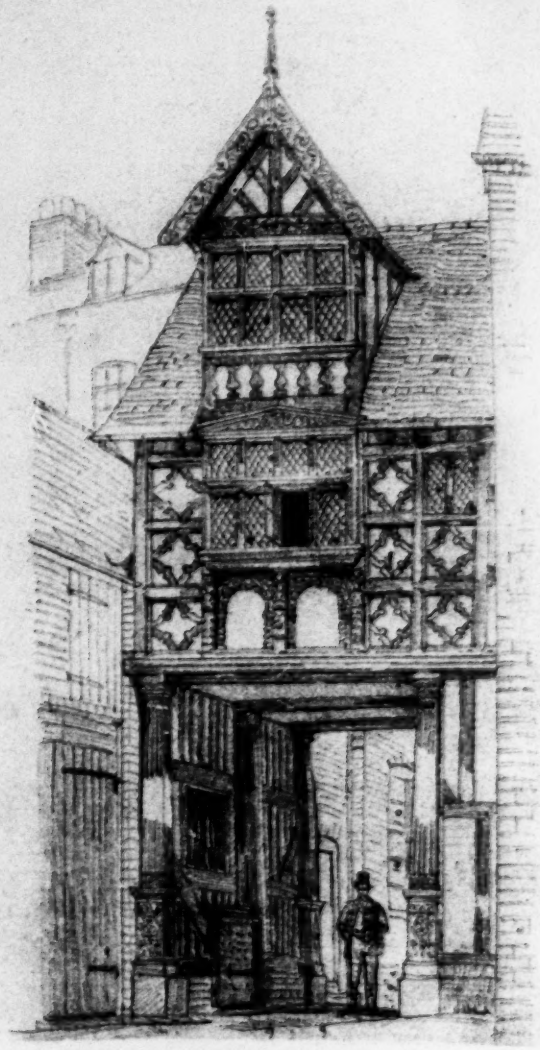
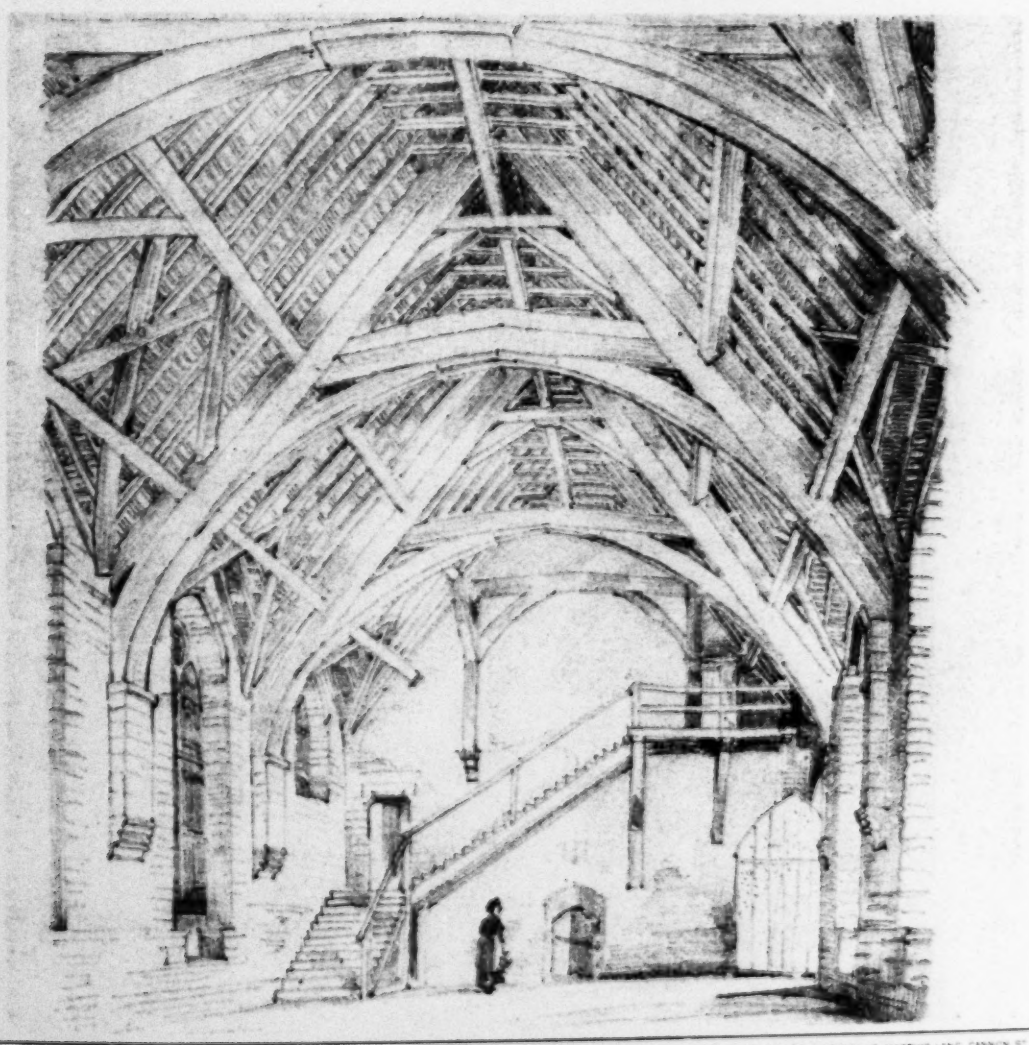


ENTRANCE TO THE OLD GUILDHALL, SHREWSBURY.



INTERIOR OF THE HALL, STOKESAY CASTLE.

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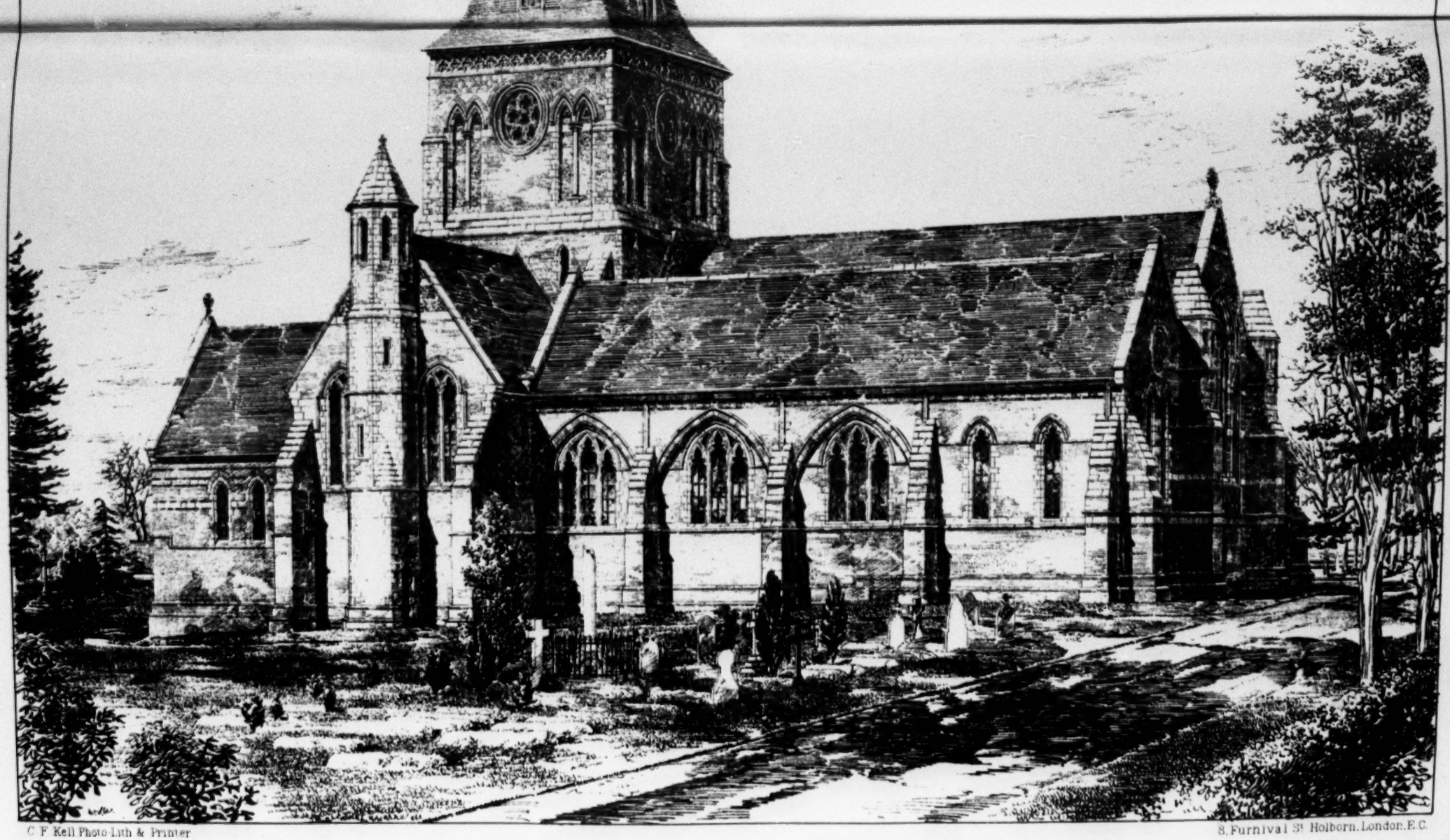
MR. H. D. WALTON, PUGIN STUDENT, 1886.



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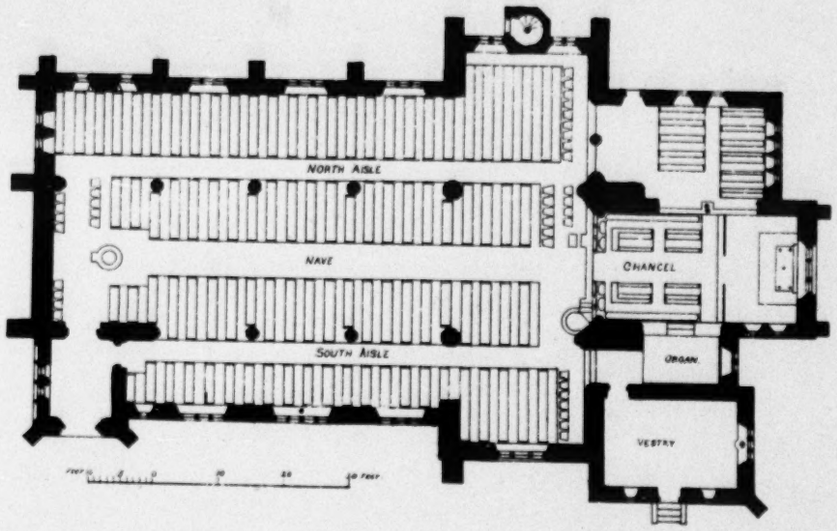
SUNNINGDALE CHURCH.—Mr. J. Oldrid Scott, F.R.I.B.A., Architect.


NORTH AISLE
NAVE
SOUTH AISLE
CHANCEL
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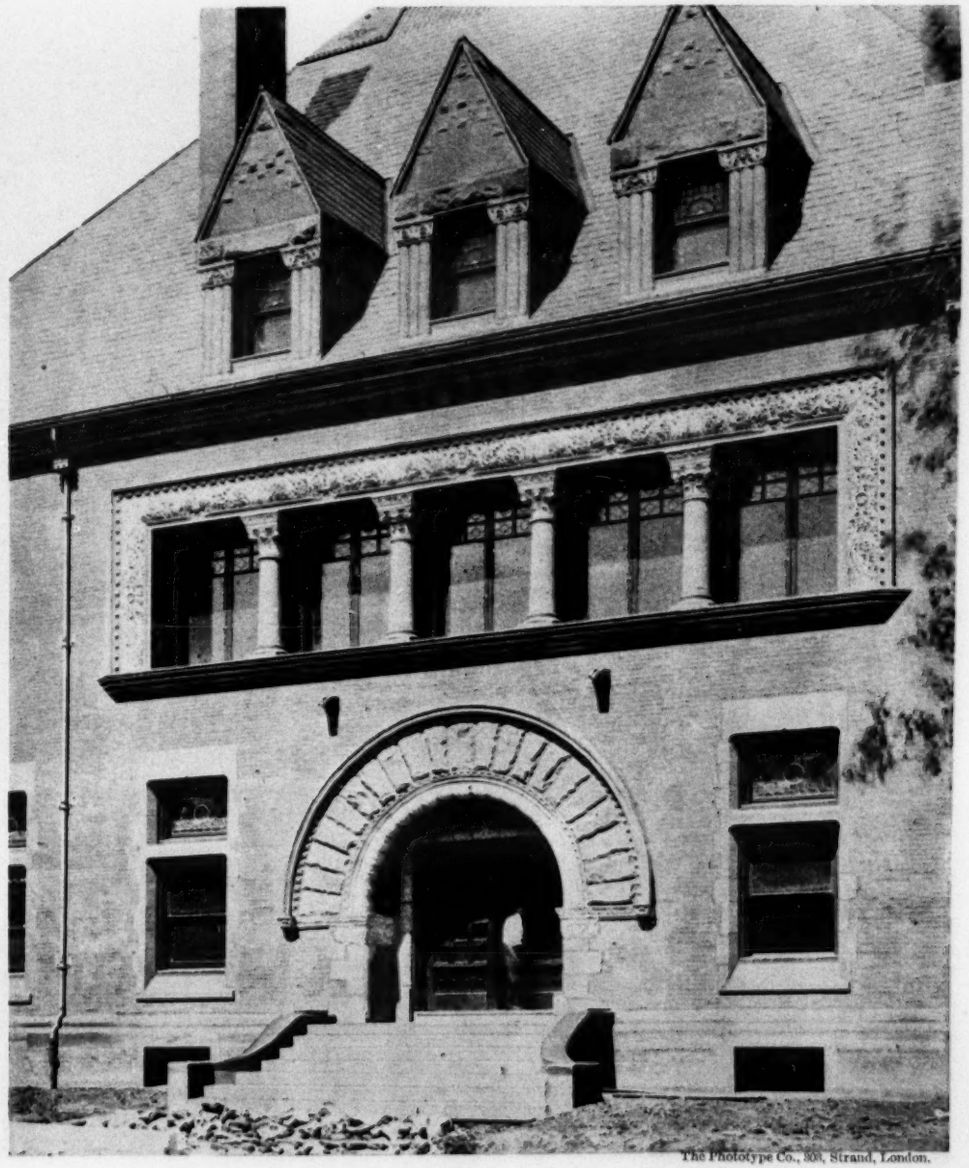
The Phototype Co., 808, Strand, London.

RESIDENCE ON THE LAKE SHORE, CHICAGO. Messrs. Cobb & Frost, Architects.

AMERICAN HOUSE ARCHITECTURE.

STORES AND OFFICES. Messrs. CABOT & CHANDLER, ARCHITECTS.



The Phototype Co., 303, Strand, London.

FRONT OF CLUB HOUSE, ST. LOUIS.
Messrs. PEABODY & STEARNS, ARCHITECTS.

AMERICAN HOUSE ARCHITECTURE.

CHAINS.

AT a recent meeting of the Civil and Mechanical Engineers' Society, Mr. Henry Adams, M.Inst.C.E., read a paper, of some interest to builders and contractors, on "The Use and Care of Chains for Lifting and Hauling." He divided chains into two classes, those with oval links and those formed of flat bars or plates; the former were again subdivided into "common" and "short-linked" chains. The latter, being of the most importance, received the principal attention; it was pointed out that the links being well rounded, each one acts as a spring when the load surges, and hence their universal adoption for lifting purposes. The dimensions of the links are for the extreme length and breadth $4\frac{1}{3}$ and $3\frac{1}{3}$ times respectively the diameter of the iron of which the link is made. In repairing or joining a chain the new link has to be made a little longer, to give room for welding, as there are two others in it instead of one, as in making a new chain. The various modes of welding were then described, and the peculiar tendency of some chains to twist while in use. The different sheaves in use according to circumstances were shown upon the diagrams, the diameter in any case being not less than thirty times that of the chain-iron. The loose end of the chain should have a swivel, either separate or as part of the hook, and all cranes, except coal cranes, should have counterweights. In these cases, as the tubs have to be pulled from under the hatchway coamings, no counterweight is admissible. Several illustrations of chain-fastenings were shown and described, and the modern forms of hooks and shackles were contrasted with those thought to be "nice" some years ago. Conveyance sheaves and other supports, chain boxes for cylinder ends, and the best position of the machinery for cranes and hoists, were described, and reference was made to Mr. Westmacott's patent cupped drum-gearing for cranes, capstans, and gate engines. Turning chains next came under review, and the various methods of connecting them to the crane. Stud-link chains, being used only for ships' cables and mooring purposes, were passed over with only one remark, that the use of the stud was to prevent the chain getting kinked, and that it added slightly to the strength for a steady pull by keeping the link in shape. The strength of chains received very full notice. It was shown that with Crown S C iron of B B quality, equal to an average tensile stress of 26 tons per square inch, an elongation of 15 per cent., and a contraction at point of fracture of 20 per cent., the chain should have a strength of double this, because two sides are acting, or one side with a leverage of 2 to 1; but there is usually a loss of 25 per cent. from imperfect welding and other causes. Several defects in welding were explained, and specimens of an interesting collection of defective links were handed round. From a large table of formulæ we select the following, d being the diameter of iron in $\frac{1}{4}$ in.:—Breaking weight in tons short-linked crane chain $= \frac{1}{2}d^2$; Admiralty proof strain in tons $= \frac{1}{10}d^2$; safe load for ordinary cranes in cwts. $= 1\frac{1}{4}d^2$; safe load for coal cranes in cwts. $= 1\frac{1}{2}d^2$; weight in lb. per fathom $= d^2$. The proof test is made upon lengths of 15 fathoms each, the breaking test upon 4 ft. lengths. The author then described in detail the system adopted for the care and maintenance of the chains at Messrs. Cory & Son's coaling establishments, where he has been responsible for chains which have lifted upwards of 15 million tons of coal in the last ten years, and during that period only one fatal accident occurred from a chain breaking, although the machinery is at work day and night, and the men necessarily work under the cranes. The inspection and lubrication are very thorough, and each chain will make about 100,000 lifts before it is worn out for lifting purposes, it is then cut up into sling chains, barge moorings, &c., as there are still many years of useful life in it. In hotels, warehouses, and large offices, much damage is done by the servants sweeping the dust off each floor into the hoistway, the dirt cutting the chain like emery. Coal dust is not very detrimental to chains, but coke dust is decidedly bad. Sling and fall chains used in the erection of machinery and buildings are always used dry, for various reasons. They should be put through a wood fire, and annealed after every large contract, or, say, every two years, and carefully examined by a skilled man before being taken into use again. In summarising the points of economy in the maintenance of chains, the author said the testing should be moderate, the annealing frequent, the lubrication thorough, and when the wearing is not uniform throughout the length, the chains should be cut and pieced when partially worn, so that when finally discarded, each link shall have done its full share of work without overstepping the limits of perfect safety.

An animated discussion took place, in which the President and several members and visitors joined, and the proceedings closed with a vote of thanks to the author for his excellent paper, and for the large collection of diagrams and specimens by which it was illustrated.

CIRCULAR AND BAND SAWS.

IN a very interesting paper read at a recent meeting of the Institution of Civil Engineers by Mr. Lewis H. Ransome, of the firm of Allan Ransome & Co., the author gave the results of his observations during a recent visit to the chief timber-producing districts of the United States. He dealt chiefly with the pine-growing forests of the Saginaw Valley in Michigan, and after describing the general arrangement of the saw-mills, went on to consider the merits of band-saws as against circular saws for the conversion of timber.

Mr. Ransome discussed the question from four points of view, viz.:—1. Rapidity of Production. 2. Quality of Work. 3. Power Consumed. 4. Waste of Wood.

In rapidity of production the circular saw has at present a decided advantage, producing on an average in white pine 50,000 square feet of lumber, 1 in. thick, in a day of ten hours, while the band-saw in the same time turns out on an average about 35,000 ft. It should, however, be borne in mind that the circular saw, having been in use for so many years, has probably reached its utmost limit of production, while, on the other hand, the band-saw, having been but recently introduced for this purpose, is capable of considerable further development. This assumption is confirmed by the fact that a band-saw mill of the most improved construction has been known to produce as much as 52,000 ft. in a day of ten hours, the produce of 102 logs.

As regards quality of work, the advantage is undoubtedly on the side of the band-saw, for whereas it is practically impossible to run a large circular saw at a high velocity without a certain amount of vibration, which naturally produces a somewhat rough surface, a band-saw, being packed immediately above and below the cut, passes through the log in a straight line; and, moreover, as the teeth of a band-saw are considerably finer than those of a circular-saw, they produce a smoother surface.

Owing to the question of power being so little considered in America, and to the fact that the application of the band-saw for logs is comparatively new, no authentic tests as to the power required by the latter machine have as yet been made with the indicator; but by comparing the engines usually employed to drive both the band and circular mills, an approximate idea on this point may be arrived at. To drive a circular-mill with a 6-ft. saw, an engine with a cylinder 18 in. in diameter, a piston-travel of 500 ft. per minute, and an average pressure on the piston of 40 lb. to the square inch, is generally employed. Such an engine develops 154 indicated h.p. To drive a full-sized band-mill, an engine with a cylinder 12 in. in diameter, working under similar conditions as to piston-speed and average pressure, is recommended. This would develop about 68 indicated h.p., or considerably less than one-half that required to drive a circular-mill.

The last, but certainly not the least, important point, is the question of waste of wood; and here again the band-saw gives by far the best results. The amount of wood lost in sawdust per cut by a circular saw is $\frac{5}{16}$ in.; therefore when producing boards 1 in. thick the waste is 24 per cent. A band-saw at most wastes $\frac{1}{8}$ in. per cut, or, when cutting 1-in. boards, 11 per cent. Again, to make a board, cut by a circular saw, when planed on both sides, hold up to $\frac{1}{4}$ in., it must be cut 1 in. thick; *i.e.*, $\frac{1}{16}$ in. must be allowed on each side for planing; while, on the other hand, owing to the superior cutting of the band-saw, it is only necessary to allow $\frac{1}{32}$ in. on each side for planing, showing an additional saving of $\frac{1}{16}$ inch per cut. This gives a total saving of $\frac{1}{4}$ in. per cut by the use of the band-saw.

The foregoing calculations apply to timber of such a size as can be converted by a circular saw 6 ft. in diameter; but for larger logs it is necessary to employ an overhead-saw, and as the tracks of the two blades never exactly coincide, the boards thus sawn show a joint, which necessitates a still further waste of wood. This objection does not apply to the band-mill, which will saw through logs of any diameter.

From the above considerations the author concludes that for the conversion of pine logs "the balance of advantages lies distinctly with the band-saw"; but in the case of harder, smaller, and more valuable timber, the benefits to be derived from its use would be very much increased, and he considers it to be the machine which will supersede the circular saw.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

AT the meeting of this Association on Wednesday, May 18th, Mr. W. H. Cope in the chair, it was announced that the President of the approaching Congress at Liverpool, Sir J. A. Picton, had fixed the date for commencement on August 15th.

Mr. Loftus Brock, F.S.A., reported the discovery of a portion of Old London wall, which had served partly as a foundation for the houses on the east side of Wormwood-street, Aldgate, now removed. The wall is of fine Roman work, having a chamfered plinth of dark brown ironstone, various bonding courses of bright red brick, and facework of squared Kentish rag-stone. Nearly opposite the Synagogue in Bevis Marks, the foundations of a circular bastion have been met with. It is not bonded into the wall, showing that it is of later date. It is formed almost entirely of worked freestone, evidently taken from other buildings, as if for its erection in haste. In the discussion which ensued, Mr. Thos. Blashill referred to other examples of additional defensive works being added to earlier Roman works, for strength in a military sense.

Mr. Howlett exhibited several fine heraldic paving tiles, bought at Croydon, and probably obtained from either the old Palace or the Church. One bears the date 1303, in Latin numerals.

A paper was read by Mr. Loftus Brock on certain sculptured stones of Pre-Norman date, in various churches which were inspected during the recent Durham Congress. After detailing the efforts made by the Association to direct attention to the remarkable class of monuments referred to, which have now been met with throughout Great Britain and Ireland, the lecturer passed in review the various examples inspected on the occasion referred to. Apart from the fine collection at Durham, the principal objects were seen at Gainford, Dinsdale, and at the neighbouring ruined church at Sockburn, although almost every church in the district appears to have some relic of the same kind. They consist of fragments of crosses, shafts, and panels filled with elaborate interlaced work of a class which was but little understood a few years ago, except to a few investigators. Some of the examples at Auckland resemble thirteenth-century work in the beauty of their elaborations, and many examples must have been executed by a chisel.

In the discussion which followed, Mr. de Gray Birch referred to the resemblance of their patterns to those of the Saxon MSS.

Association of Municipal and Sanitary Engineers and Surveyors.—A Home Counties District Meeting of this Association is to be held at Portsmouth on Saturday next, June 4th. Arriving at Portsmouth (Town Station), the members will proceed to the Council Chamber, High-street, kindly placed at the disposal of the Association by the Mayor, where, at 12·15, Mr. Boulnois will read a short paper descriptive of the drainage works of Portsmouth recently carried out by Sir Frederick Bramwell. At 1·0, a visit will be made to the works, where the members will be entertained at luncheon by Messrs. Mowlem, the contractors. They will subsequently visit the Town-hall works, to be shortly described by Mr. Boulnois.

"A STUDENT'S NOTES ON GLOUCESTERSHIRE."*

IN these days, when the opportunities for travel are generally limited to a matter of a few weeks, it becomes an important question how the time can be used to the greatest advantage. It is no longer possible in most cases to do as our architectural predecessors used to do,—go abroad for two or three years after they had finished their time in an office, and so get an extended knowledge of the world before settling down finally; and so we have to be contented with shorter trips, and are forced, very fortunately I venture to think, to turn more to our own country. No doubt the Continent possesses great attractions, especially as regards colour, but some of our own architectural districts, although they may be surpassed in scale, are not to be equalled in many respects by the more pretentious foreign examples.

Of the many portions of England which are worthy of a visit, some are well known, such as Northamptonshire, Lincolnshire, Yorkshire, &c. Others are comparatively unknown, and the county of Gloucester is, I think, one of these. I say "county" advisedly, because no one will deny that Tewkesbury Abbey and Gloucester Cathedral are quite household words to the student. When I had the honour and good fortune to be elected the Travelling Student of the Association last year, it occurred to me that here was an opportunity to explore a fresh field. I had long had a wish to see Evesham and Pershore, and to refresh my slight knowledge of Tewkesbury Abbey, and finding in a little handbook of ecclesiology that Gloucestershire was "remarkable for the fine architectural features of its churches, and exhibits excellent specimens of every style, from Norman to Third-pointed," I came to the conclusion that I could not do better than take Gloucestershire as the field for my six weeks' study. And, looking back now at the end of a year, I feel I could not have chosen a much better place. With almost uninterrupted fine weather, some of the prettiest rural scenery in the country, and the endeavour of all whom I came across to give every facility for making my stay successful, I can truly say that it was the most delightful experience I have ever had, and my only regret is that I cannot transmit more of it to you this evening.

Having settled the part in which I was going to travel, the next thing was to find out from various sources all the particulars I could. In a comparatively short time I had brought together a sufficiently large list to make me certain that the whole could not be done in the six or seven weeks at my disposal: so, as the time could not be lengthened, the list had to be shortened. I therefore endeavoured to choose those places which would give me the best idea of the architecture, both ecclesiastical and domestic, of the county. Fortunately there was only one cathedral town, and that I decided to avoid. I say fortunately, because cathedral towns are so fascinating generally that one is tempted to spend time on them which is often better spent on places of smaller size. Gloucester, in fact, is the centre of a good district of its own, and requires almost a special trip. In the end, I settled on the scheme to be followed. I generally made use of the railway lines, only going across country in one or two places where necessary.

Leaving London, I went direct to Chipping Campden, where I made my head-quarters for a week, and found the time all too short. Under the influences of the bracing air on the spur of the Cotswold Hills on which this old town stands, and the wealth of architecture, chiefly domestic, which is to be found there, my first impression of Gloucestershire realised all my expectations. From Campden I went to Evesham, and from hence until I reached Tewkesbury, my travels were chiefly in Worcestershire, and I went over some of the ground which the Association visited in 1881. I will not dwell upon that part of my trip now, leaving one or two points which I wish to notice until later on, but will pass on to Tewkesbury, where I stayed a fortnight. From hence I visited Deerhurst, Bredon, Cleeve, and other places. Then from Tewkesbury to Cheltenham, to see Southam House and Leckhampton, and afterwards to Stow-in-the-Wold, having completed a rough circle. My object, as I said before, was to avoid Gloucester; so, instead of going back to Cheltenham, I drove across the back of the Cotswolds to Northleach, and afterwards on to Cirencester. On leaving Cirencester I found that both time and money were getting short, so I left Fairford and its stained glass for a future occasion, and recrossed the county to Berkeley. After Berkeley came Chipping Sodbury, and this was my last centre, and after seeing some of the places of interest round it, I left for Bristol, and so came out of the county at the opposite end to that at which I had entered it, and having visited, I think, most of the important places, although, of course, there was a vast deal more to see if I had had time to spend over it. Such, gentlemen, is a rough outline of my tour, and I will now endeavour, as well as I am able, to describe some of the places more in detail, with the aid of the drawings and plans exhibited on the walls.

I must now ask you to go back to the beginning again, namely, to Chipping Campden. I said before that it came fully up to my expectations, and I certainly was lucky in choosing it as my first stopping-place. It has every attribute of a good centre,—a comfortable inn, a good church, a town chiefly composed of one long broad street flanked by houses dating from the fifteenth to the seventeenth century, with a few modern ones, a fine situation on high ground, many places of interest within easy reach, and last, but not least, people who are hospitality personified, including the vicar, to whom my thanks are due for lending me the embroidery I am able to show you to-night. The first thing one generally does is to inquire "Which is my nearest way to the church?"—not that it was at all necessary here, as the church stands boldly up at one end of the main street and possesses one of the finest western towers in Gloucestershire. The church is entirely of fifteenth-century date, with the exception of the inner south door and a portion of the south aisle wall, which are Early English. The only other relic of the earlier church is a portion of a very beautiful font, which at some period has been cut in two and the surviving half has been built into a pier in the south aisle. Other objects of interest are the brass lectern, dated 1618 (and a very good specimen of the kind), a Jacobean pulpit, and, what is decidedly the most interesting, some very fine embroidery, which I am able to show you. It is probably an altar frontal, and measures 12 ft. by 3 ft. 10 in., the ground being of cream brocaded silk powdered with pomegranates, and with an elaborate representation of the Assumption of the Virgin in the centre. Two other pieces having the same patterns are still at the rectory. The western tower of this church bears some slight resemblance to the tower of Gloucester Cathedral, and is chiefly remarkable for the curious way in which the centre pinnacle is brought down and forms the finial of the western doorway.

But the student visiting Campden will probably be most interested in the Domestic work in which it is so rich. This, as I said before, includes examples dating from the fifteenth century. Of this date is a very fine old house in the main street, which possesses, almost in its original state, a very good two-storied bay-window, the whole house being very similar to many to be seen in Somersetshire. There are one or two other remains of the same date in the town, but the larger number of houses date from the seventeenth century, and seem principally to owe their existence to the building propensities of a Lord Campden. Of these there is, firstly, the manor-house, now in ruins. One or two angles of the main building remain above ground, and on its south front ran a raised terrace with a pavilion at each end. These pavilions remain in a very perfect state, and are well worth a lengthened study,—longer than I was, unfortunately, able to give them. Inside are some good plaster cornices and oak panelling. Besides these pavilions, the entrance gate to the mansion is still standing, but though the lodges are picturesque, the central part, with the entrance, cannot be called happy in design. A little distance from the lodges are twelve almshouses, making with them and the church one of the most picturesque groups I have anywhere seen. They are remarkable for their good proportion and for an entire absence of unmeaning ornament, and the details are all very good and effective. Another building of the same date,—1624,—is the old market-house, which stands in the centre of the main street. It is a rectangular building with open arcades, and a row of octagonal pillars down the centre, supporting an open-timber roof.

We will now pass on from Campden to Evesham and Pershore. I shall not attempt to describe these places, as it would occupy too much time, and they are both known to many of you. But there are one or two places near them to which I would call attention. Firstly, in the neighbourhood of Evesham, is the village of Hampton,—only, in fact, about a quarter of an hour's walk from the town. The church here is worthy of notice, as being a perfect specimen of a small fifteenth-century church. It consists of a nave, central tower, and chancel, and its plan at first sight is very suggestive of its having been built on Norman foundations. However, nothing earlier than the Perpendicular period is visible. The south porch of the nave has a stone-ribbed ceiling of plain but effective work. Inside we find the central tower has stone vaulting, and there are traces of where the rood-screen existed on the tower piers. These piers have immense chamfer stops, about 4 ft. from the ground, and are the only features which strike one as being out of proportion to the rest of the building. There are here in the windows, and again at Wyre, near Pershore, some bits of contemporary stained glass, and it always strikes one on seeing these bits how very easy it is to get a satisfactory effect by simple means, instead of that elaboration with which we so often see the upper portion of a modern window treated, and generally with such unsatisfactory results.

Another church, a little further from Evesham, is Sedgeborough. This, like the one at Hampton, is all in one style,—in this instance that of the fourteenth century. Its plan is a simple rectangle, without any mark externally of the division between nave and chancel, and instead of a square tower it has at the west end a very elegant octagonal turret crowned with a spire. The window tracery of this church is very beautiful, and there is one piece of stained glass which is said to represent the founder, and as he is holding a church, the suggestion seems probable. Before its restoration the church possessed the lower part of a rood-screen, but this has been replaced by a modern screen, which strikes one as being much too high for the church. There is still lying in the churchyard a fine gable cross, which has been replaced by one of modern work,—a change not altogether for the better.

The only object I would draw your attention to at Pershore is a piece of screenwork now in the south transept. It consists of a piece of woodwork, having four traceried panels with elaborately-carved spandrels and cusps, and over it is a curious inscription.

Near Pershore is Besford, which possesses a curious little church entirely of wood (with the exception of the chancel, which has been rebuilt in stone). Inside is a portion of the rood-screen, the panelled front retaining its old colouring. About three miles distant, across the river Avon, is another village, Strensham, which possesses a painted rood-screen, which should on no account be missed.

We now come into Gloucestershire again at Tewkesbury. The abbey, as I have before said, requires no description from me. I shall again draw your attention more particularly to two or three villages which you ought to see if you make Tewkesbury a centre at any time. The nearest of these places is Deerhurst, well known on account of its recently-discovered Saxon chapel. There was a priory here, of which some traces still exist near the church in a farm-house. The church itself has been mutilated, the chancel having been destroyed, but it possesses some very beautiful arcades of Transitional Early English work, with an interesting series of carved caps, illustrating very completely the gradual growth of the Early English foliage out of the Norman cushioned form. Besides the arcades are some fine Decorated windows, a very fine Saxon font covered entirely with cable ornament, and some bits of stained glass, of which the St. Catherine is perhaps the best. Attached to the Saxon chapel, which is at some little distance south-west of the church, is a very elegant specimen of half-timbered work known as Abbot's Court, and as this kind of work is not very prevalent in the county, this specimen is particularly interesting.

A few miles north of Tewkesbury is Bredon Church, which is perhaps one of the most interesting of the places I visited. It is, strictly speaking, in Worcestershire, but only

* A paper by Mr. Roland W. Paul. Read before the Architectural Association on the 20th inst., as elsewhere mentioned.

just over the border. The ground-plan of this church is very curious, and at the same time is useful as showing how a church could be added to at random without affecting the ritual, as compared with the present more general use and planning for congregational purposes. We have here the old Norman central tower, and the walls of the nave, left. The side walls were pierced in the thirteenth century on the south side for a chapel, and again in the fourteenth century for a north aisle, and at the same time the chancel was reconstructed and the tower raised. This was crowned with a lofty spire in the fifteenth century. Perhaps transepts were meant to be added, but they were not built, and this has left the ground-plan of the building very much in the shape of a tadpole, excluding the people who sit in the aisles from a view of the chancel. The chancel is probably the most interesting part of the church. The first object that strikes the visitor is a large number of armorial tiles, which no doubt were formerly in the floor, but are now placed in the risers of the steps,—a very good way of preserving them from the constant wear, but rendering it rather a difficult matter to take accurate copies of them. I think these tiles are generally considered to be one of the finest collections in England, and they are interesting as dating from before the foundation of the College of Heralds. They are probably of early fourteenth-century date, and include the arms of a great number of the principal families of that time. In all I was able to find thirty-four shields, of which I exhibit a few. Besides the tiles is a curious monumental stone on the south side of the chancel, an Easter sepulchre on the north side, and a piscina with a window immediately behind it, not glazed, but only separated from it by a shutter, which still remains. The tower arches are Transitional from Norman to Early English, and there are three fine Norman doorways on the north-west and south sides of the nave. The west front is very imposing, and is flanked by large square turrets crowned with spires and arcaded. The west window is later in date. Not far from the church is a very fine tithe-barn, with a chimney worth noticing on one of the entrances.

Another church, which is, however, nearer Cheltenham, is Cleeve. Going from Tewkesbury you pass Ashchurch, where there is a fine rood-screen in good preservation. I had here the first experience, and the only one, of being prevented from sketching. The clergyman was, unfortunately, away, and the man in charge offered to show me round, but declined to allow me to sketch, and, moreover, the thought that it might be "squared" had to be abandoned. However, I have no doubt that at some future time I may be able to get a drawing of the screen, which is a very fine specimen of its kind.

Cleeve, or Bishop's Cleeve, is an extensive village about four miles from Cheltenham, the nearest way being, however, to go to Cleeve Railway Station on the Midland line, from which it is distant about two miles. The church here is considered one of the finest in the county, and is still unrestored. It is a very long church (144 ft.), and, although not at first apparent, has many points of resemblance with Bredon Church, which we noticed just now. To begin with, it has considerable remains of Norman work, its west front being, like that of Bredon, of Transitional character, but the earlier of the two, and having rich arcading on the flanking turrets. The porch, with the aisle eastward and a broad aisle opposite, and a long Decorated chancel, are all points similar to its northern neighbour. In fact, if you remove the transepts, which Bredon never seems to have had, you have an almost identical plan on a somewhat larger scale. You will, no doubt, see that the arcades of the nave are of very wide span,—20 ft. from centre to centre. The clergyman, when I was there, had a theory that at some later date the intermediate columns of the arcade had been removed. This is possible, certainly; but a far more likely thing, I think, is that when the central tower fell in the seventeenth century, it demolished a considerable part of the nave arcades, and they were rebuilt rather with a view to increase the chance of seeing the altar, than with any idea for artistic effect. The east window of the chancel has been a very fine one, but has been much pulled about. There are considerable traces of altars and reredoses, and a large number of monuments, the earliest being one in the south transept, with a Norman pillar piscina close at hand. At the west end of the nave is a very elaborate Jacobean gallery, which will probably be removed when the church is restored. It is very worm-eaten and is considered unsafe, but the front is well worth preserving, and it is to be hoped that the architect who may have this building to restore will take proper care that it is preserved. You should also notice particularly the south porch, which is Norman, with interlacing wall arcading and a vaulted roof. The room over is of large size, and,—what I have not seen before,—extends over the south aisle as well as over the porch itself, and there is a curious piece of ceiling underneath it. There are in the village some good bits of domestic work, and a large tithe-barn was in process of demolition when I was there.

Passing on to Cheltenham, you will find that St. Mary's Church has been a good deal restored, but the church is worth a visit. I only stayed in Cheltenham one clear day. In the morning I went to Southam House, and in the afternoon to Leckhampton, both of which you should see. Southam House is a manor-house of the fifteenth century, with some interesting windows, but I was somewhat startled on arriving at the entrance to find myself confronted by a "Norman" keep. This, I need scarcely say, is modern, and is part of the extensive addition which the late Lord Ellenborough made to the house, and is more remarkable for quantity than quality. In fact, the original fifteenth-century house is so dwarfed by the Norman additions that it is some little time before one fully realises its existence at all. The owners were away when I went there, but I was allowed to make two slight sketches of the outside of the mansion. The other place of interest,—Leckhampton,—is south of Cheltenham. The church here is interesting from its possessing a chancel of two stories. The only remains of the old church are the said chancel and the tower,—the rest having been rebuilt. The tower is about 14 ft. square, and is crowned with a long tapering spire, of curious proportions. Another similar spire occurs at Shurdinghan, in the same district. The chancel is 14 ft. in length and 12 ft. wide. The room over the chancel is approached by the same staircase which leads to the ringing-chamber of the tower. The east window seems to have been raised, for the upper part is concealed by the vaulting. There is no record saying for what purpose this room was used. There is an interesting tomb in this church, with two recumbent effigies commemorating St. John and Lady Giffard.

Stow-in-the-Wold is very finely situated on the summit of a hill, standing by itself apart from the Cotswold Hills, and is seen for many miles around. The church here is Early, and the tower is at the east end of the south aisle. It is, I think, one of the most satisfactory towers I saw during my trip. It is very plain in character, the only enrichment being an embattled and panelled parapet. Stow was connected with the abbey of Evesham, and the tower seems to have been finished by the same hand that built the famous bell-tower there.

Near Stow is Icomb or Iccomb, and here is to be seen a very picturesque Early English church, and an equally good fifteenth-century manor-house, known as Icomb place.

Northleach is one of the most inaccessible places in the county, being eleven miles from Cirencester, and nine from Stow, and lies in a very secluded valley at the back of the Cotswolds. But the church here is worth the journey from London to see. Although not covering so much ground as some of the other churches, it is very lofty, and gives one an idea of its being much larger than it really is. Its south porch is very elaborate, and inside will be found a good stone pulpit (like those to be found in Somerset), the remains of two or three altars, fine stained glass, and many other details of interest.

Again, at Cirencester is a fine church, and this is remarkable for the number of chapels which have been added. On the south side is a porch of very large dimensions,—so large, in fact, that at one time it was used as a town-hall. The bulk of this church is of fifteenth-century work, but there is in one of the south chapels a fine Early English cap, and some of the walls are also of the same date. There is another stone pulpit here, and some very fine screenwork.

There is a very interesting district between Cirencester and Stroud, round Minchinhampton, but I cannot say anything of the places in it, as I passed by them, and went on to Berkeley and Sodbury.

In Berkeley Castle you should particularly notice the interior of the chapel, with its gallery of wood at one end, richly carved. The church is a large Early English building, with a curious chapel of the Berkeleys on the south side of the chancel. There is a stone rood-screen in this church, the peculiar design being owing to a failure of the imposts of the chancel arch. A second stone screen occurs in the Berkeley Chapel, and there is a curious series of squints,—one from the church to command the side altar in the chapel, and another in the chapel wall to command the high altar.

About a mile and a half from Berkeley is Wanswell Court, which is a very perfect house of fifteenth-century date, with its hall, 25 ft. by 22 ft., solar, kitchen, and bedrooms, and an addition made later by the family of Thorpe, who resided here in the time of Elizabeth. The solar has a window in each of the two front angles, one commanding the entrance, and the other the eastern approach. There are one or two fine fireplaces, and a good roof over the hall.

At Chipping Sodbury you will find a church which might have been transported from Devon or Cornwall. It is long and low, with the centre and side aisles of equal length, and a lofty tower at the west end, quite plain except the belfry windows at the top. The church was restored by the late Mr. Street. Inside is a pulpit approached by a staircase in the thickness of the wall, and there is a very elegant remnant of an altar at the east end of the north aisle, which could easily be missed, as the organ fills nearly the whole of the space in front of it. Chipping Sodbury resembles Campden in the fact that it consists chiefly of one broad street, and has a great many old houses on both sides.

About two miles east is Little Sodbury, and here is to be seen another fine old fifteenth-century house with a splendid hall, 32 ft. by 23 ft. Near Sodbury, westward, are Yate and Iron Acton. Yate has a very fine west tower, something like that of the Temple Church at Bristol, and the church itself consists of three long aisles without any chancel arch, like Chipping Sodbury. At Iron Acton is another fine church, with tombs, good stained glass, a Jacobean pulpit, and in the churchyard a curious preaching-cross. In the same district is Thornbury Castle, which, I am sorry to say, I missed, but it is no doubt well known to you in Pugin's book of "Examples."

This, gentlemen, completes these rough notes on Gloucestershire, and you, perhaps, will ask which of all these places are the best worth seeing, to which I would reply "All." I feel myself that I could thoroughly enjoy going over the same ground again, as I had to hurry a good deal over some of the places, but to any one who wished to see the best I should feel inclined to recommend the following, both for centres and good work in the places themselves:—

For Church-work,—Cirencester, Northleach, Berkeley, and Tewkesbury:

For Domestic work, — Chipping Sodbury, Icomb, Chipping Campden, and Berkeley.

A report of the discussion which followed will be found on another page.

Baths and Lavatories.—We have received from Messrs. Steven Bros. & Co., of Upper Thames-street, a copy of their New Illustrated List of Baths and Lavatories, which contains illustrations of the various patterns of cast-iron baths manufactured by the firm, and prices of the same, either plain, japanned, or in the various degrees of enamel. The book also contains a coloured illustration of one of their baths, fitted complete, in one of the mahogany casings which they supply. A variety of cast-iron lavatories are also shown, and a number of cabinet-stands. The catalogue also gives a section of a dwelling-house, showing method of the hot-water circulation, which will, no doubt, prove useful. We commend Messrs. Steven Bros.'s New Bath List to buyers of this class of goods, of which we have often previously spoken in terms commending their uniform good quality.

Destruction of a Paris Theatre by Fire.—On Wednesday night the Paris Opéra Comique was destroyed by fire, with a loss of (according to the latest reports) twenty lives.

THE ANNUAL CONGRESS OF FRENCH ARCHITECTS.

THE following is the text of the programme for the Congress of this year, to be held at Paris next month :—

Lundi, 6 juin.

à 3 h.—Constitution du Bureau et ordre des travaux du Congrès.—Nomination des Commissions sur les questions suivantes ; *Concours publics Honoraires, Hygiène, Voirie, Industrie du Bâtiment, Propriété artistique, Responsabilité,* &c.—L'Architecture au Salon de 1887, par M. Loviot, architecte, membre de la Société.—Notice sur la vie et les œuvres de M. Ruprich-Robert, architecte du gouvernement, inspecteur-général des monuments historiques, membre de la Société.—De la circulaire de M. le Ministre de l'Instruction publique et des Beaux-Arts relative aux honoraires et à la responsabilité des architectes attachés au service des Bâtiments civils (*Officiel* du 2 avril, 1887).—Communications diverses.

Mardi, 7 juin.

à 9½ h.—Visit du Val-de-Grâce.

à 3 h.—*Les Eglises et les Mosquées de Constantinople*, par M. A. Gosset, architecte à Reims, membre de la Société.

à 4½ h.—Visite de l'atelier et des travaux de M. Victor Galland, rue Fontaine-Saint-Georges, 25.

Mercredi, 8 juin.

à 10 h.—Visite du Palais du Luxembourg.

à 3 h.—*Les dernières fouilles en Egypte et le déblaiement du Temple de Louqsor*, par M. Maspéro, membre de l'Académie des Inscriptions et Belles-Lettres.—*De la Décoration théâtrale*, par M. J.-B. Lavastre, peintre-décorateur de l'Opéra.

Jeudi, 9 juin.

Excursion au château de Dampierre, aux Vaux de Cernay et à Chevreuse.

Départ de Paris pour Versailles :—

Gare Saint-Lazare, à 8 h. 25. Gare Montparnasse, à 8 h. 05.

Des voitures pour l'excursion attendront à Versailles à la gare de la rive droit d'où elles partiront à 9 h. 15 m. précises.

Retour : Départ de Versailles ..... { Rive droite, 6 h. 55, arrivée 7 h. 30. Rive gauche, 6 h. 35, arrivée 7 h. 15.

Vendredi, 10 juin.

Matinée réservée à la *Caisse de Défense Mutuelle.*

à 3 h.—Distribution des médailles décernées par la *Société Centrale des Architectes* à l'Architecture privée, à l'Ecole des Beaux-Arts, aux Ecole privée, aux industries d'Art, au Cercle des Maçons, au personnel du Bâtiment, MM. PAUL SÉDILLE, Vice-Président, et PAUL WALLON, Secrétaire principal de la Société, rapporteurs.—Notice sur la vie et les œuvres de M. *Le Soufaché*, censeur de la Société, par M. Ch. QUESTEL, membre de l'Institut, censeur de la Société.

Samedi, 11 juin.

à 9½ h.—Visite des travaux de l'Exposition universelle de 1889—Rendez-vous, pavillon Rapp.

à 3 h.—Compte rendu du Congrès des Sociétés savantes, par M. Ch. LUCAS, architecte, membre de la Société. Communications diverses, rapports des Commissions nommées le 6 juin.—Clôture du Congrès.

à 7 h. très précises—Banquet confraternel, à l'Hôtel Continental.

NOTA.—Tout membre du Congrès devra prévenir à l'avance le Bureau pour être autorisé à traiter une question relative à l'Architecture ou à l'Archéologie, en dehors de celles indiquées ci-dessus. Pour toute demande d'invitation ou tout autre renseignement, écrire au *Secrétaire du Congrès*, au siège de la Société Centrale des Architectes, boulevard Saint-Germain, 168.

The Recent General Conference of Architects.—The number of the "Journal of Proceedings" of the R.I.B.A. issued this week says,—"Following the usual custom, the Royal Institute has not claimed the copyright of any of the papers read at the meetings of the recent Conference. The *Builder*, in two special supplements of sixteen pages each (issued 7th and 14th inst.), has printed them *in extenso*, giving at the same time a very full and careful report of the discussions which followed,—a work attempted by no other journal. This, undoubtedly, involved considerable extra expense, to say nothing of extra editorial labour; and the enterprise thus shown is worthy of hearty recognition from the Royal Institute. A separate pamphlet, to contain all the papers read on the Education question, with notes and appendices referring thereto, is also in course of preparation, under the charge of Mr. Arthur Cates, the Chairman of the Education Meeting, and it will be printed and privately circulated at his expense."

THE ARCHITECTURAL ASSOCIATION.

ELECTION OF OFFICERS FOR SESSION 1887-88.

THE closing ordinary meeting of this Association for the present session was held at 9, Conduit-street, on the 20th inst., Mr. J. A. Gotch (President) in the chair.

Votes of thanks were passed to Mr. A. Waterhouse, R.A., for permitting the Association to visit the National Liberal Club, and to Mr. Thomas Warburton, the clerk of works, for conducting the visitors over the building.

The Chairman intimated that the judges of the Prize Committee had sent in their award with regard to the travelling studentship, which had been gained by Mr. Alfred Henry Hart. They further recommended that Mr. Henry Philip Burke Downing should receive a second prize of 5*l*.

Mr. H. D. Appleton (Hon. Sec.) announced that the date for sending in the drawings for the Aldwinckle Travelling Studentship had been extended to the 15th of July next.

The Chairman added that the preliminary conditions of the Aldwinckle Studentship were so simple and easily fulfilled that it would be be a great pity if it were not adequately competed for. The prize consisted of 20*l*., for travelling in a place to be decided upon by the winner.

It was announced that the first vacation visit would take place on Saturday, the 28th inst., when the members would inspect the fine house built by Messrs. George & Peto for Mr. Henry Doulton, called "Woolpits," near Cranleigh, Surrey. A visit had also been arranged for the 11th prox. to a house by Mr. Norman Shaw, at Banstead Park; and on the 18th prox. there would be a day visit to Cambridge.

Messrs. Fleming and Paterson were appointed scrutineers to count the voting papers for the election of office bearers.

Mr. Burrell (Hon. Librarian) announced a donation by Mr. W. W. Pocock of a historical account of the Worshipful Company of Carpenters, and another by Mr. Florence, consisting of fourteen volumes of the *Builder*, from 1851 to 1864 inclusive. Votes of thanks were passed to the donors.

The following new members were elected, viz., Messrs. W. B. Parry, W. A. D. Pern, H. E. Ayling, and H. A. Saul.

Mr. R. W. Paul then read a paper entitled, "A Travelling Student's Notes in Gloucestershire," which we print on another page.

The Chairman, in opening the discussion, said he had listened with much interest to Mr. Paul's paper because he had gone to that special quarter of England with great enthusiasm, and seemed to have explored it thoroughly. It was extremely satisfactory to find that a Travelling Student of the Association should come and give the members the results of his labours. A glance round the walls showed them that Mr. Paul had made good use of his time, and when it was borne in mind that he had only been away six weeks, such a show of plans, sketches, perspective views, and full-sized details was a most creditable result. The nature of the paper precluded discussion in detail, and he (the speaker) could not throw much light on the question, as he was not thoroughly cognisant with the district. He had been to Gloucester, but the cathedral had not much interest for him with the exception of the fine Lady-chapel and the most complete cloisters, perhaps, to be found in England. Tewkesbury and Pershore had been visited by the Association, but they had not gone so far south as Mr. Paul had been. There was an interesting place north of Tewkesbury, called Severn End, a mixture of red brick and half timber. He could fully endorse Mr. Paul's suggestion that in England was to be found work of as great value and interest as any that could be found abroad.

Mr. H. O. Cresswell, in proposing a vote of thanks to Mr. Paul, complimented him on his charming set of sketches, and the good use he had made of his time. A point in the paper had struck him, as one which all the younger students of the Association would do well to note, viz., that Mr. Paul appeared to have studied the smaller buildings more than the larger ones. There was little doubt that young students, and older ones too, would often get a more complete idea of buildings by studying small ones thoroughly than by studying big ones imperfectly. He was afraid they ran too much to cathedral cities, and although Mr. Paul might have spent a great deal of his time in Gloucester, Worcester, Hereford, and Tewkesbury, he had been wise in devoting his attention to smaller places. From the smaller churches, which could be thoroughly seen, and probably sketched, in a day, ideas could be got which were more likely to be useful to young men than the study of the grand and magnificent cathedral arrangements. He (the speaker) had seen several of the places where Mr. Paul commenced his tour, and they had struck him as containing a great deal that was interesting both from the point of view of ecclesiastical and domestic architecture.

Mr. Leonard Stokes seconded the vote of thanks, adding that Mr. Paul had shown a good example of industry and rapidity in his work. One very good point in his work was that he had taken so many plans, and especially of the churches, a course which was of great assistance in recalling the design; for all design was based upon plan, and out of it the details grew to a very great extent. It was, therefore, a most valuable thing to study plans. Mr. Paul's domestic work was also very good, and he hoped that the editor of the "A. A. *Notes*" might give a list of the several places visited by Mr. Paul which might be useful to the members.

The Chairman thought that Mr. Paul might add to the list of places, some of the chief features and dates for publication in "A.A. *Notes*."

The vote of thanks was then put and carried.

Mr. Paul, in replying, said that though most of the plans had been drawn on the spot, they had had to be enlarged for the purpose of illustrating his paper, and the labour of doing that could not, of course, be included in the six weeks' work. On visiting a church his first duty, as a rule, was to make a ground-plan. At Tewkesbury he spent the first day in walking round the building, for in dealing with such a large place one did not know at first where to turn, or to see what was best deserving of study. A good deal of time could be saved in making a plan if it were done on scale-paper. This was divided into squares, enabling the student to draw out a plan in a third of the time that would otherwise be taken. By estimating so many feet to the square, and going round with a 5 ft. rod, a big plan could be done in half an hour or three-quarters. He took with him a 10 ft. rod in two parts, the 5 ft. rod not being always sufficient, as there were certain heights that could not be easily reached, especially in out-of-the-way churches, where there were no ladders. As to the information for the "A. A. *Notes*," he would be only too glad to supply the editor with any additional information that might be desired, and also with a sketch map as an illustration of the route.

Election of Officers.

The scrutineers then presented their report on the voting for new officers, and the results were announced as follows :—

President.—Mr. John Slater, B.A., F.R.I.B.A.

Vice-Presidents.—Messrs. H. D. Appleton, F.R.I.B.A., and L. A. S. Stokes, A.R.I.B.A.

Committee.—Messrs. Cole A. Adams, F.R.I.B.A.; F. T. Baggallay, A.R.I.B.A.; R. L. Cox, A.R.I.B.A.; H. O. Cresswell, A.R.I.B.A.; E. Guy Dawber, Arthur J. Gale, A.R.I.B.A.; J. A. Gotch, F.R.I.B.A.; E. J. May, A.R.I.B.A.; C. R. Pink, F.R.I.B.A.; and G. G. Woodward.

Hon. Treasurer.—Mr. J. Douglass Mathews, F.R.I.B.A.

Assistant Treasurer.—Mr. H. W. Pratt, A.R.I.B.A.

Librarian—Mr. W. Burrell.

Hon. Secs.—Messrs. Thomas Edward Pryce, A.R.I.B.A., and F. R. Farrow, A.R.I.B.A.

Auditors.—Messrs. A. C. Bulmer Booth, A.R.I.B.A., and F. E. Eales, F.R.I.B.A.

Mr. G. Richards Julian said that before the meeting closed he thought the members ought to pass a vote of thanks to the retiring President for the manner in which he had discharged the duties of his office. The Architectural Association had been very fortunate in its selection of presidents, and he believed that in Mr. Gotch the high standard attained had been well kept up (applause).

Mr. Leonard Stokes seconded the motion, adding that, although Mr. Gotch resided in the country, he had not missed a single meeting, and few if any of the committees. Mr. Gotch was heart and soul with the Association, and would remain so, he believed, for many years to come (applause).

Mr. H. D. Appleton, in putting the resolution

to the meeting, remarked that Mr. Gotch had been elected a member of the Council of the Royal Institute of British Architects, to represent the Architectural Association during the next Session (applause).

The vote of thanks was then passed by acclamation.

The Chairman said he was exceedingly obliged for the kind and flattering way in which the proposition had been received. When he had the honour of being elected as President he made up his mind to discharge the duties as well as he could, and no special credit was due to him for attending the meetings. Living in the country did make a certain difference, and he was afraid that as he had now been elected to represent the Association on the Institute Council, which would entail a visit to London once a fortnight on the Monday, he might not be able to put in an appearance at the Association meetings on Fridays so frequently as he had done in the past. At the same time, if he were not working so much for the Association in its own rooms he would be forwarding its interests to the best of his ability upstairs (applause). It had been a matter of very great pride to him to be the President of the Association, and he should always look back with pleasure to the time when he occupied the chair and to the kind way in which he had been supported by the members (applause).

Mr. H. O. Cresswell next proposed a vote of thanks to Mr. Herbert D. Appleton, who was now retiring from his arduous duties as Hon. Secretary, and passing to the more honoured and dignified position of a Vice-President. No one who had had anything to do with the Architectural Association for a good many years could have failed to notice the extremely energetic manner in which Mr. Appleton had carried out his duties. He had been the life and soul of everything, and on his retiring from the Secretaryship the members ought to tender him a very hearty vote of thanks (applause).

Mr. W. Burrell seconded the motion.

The President, in putting the resolution, remarked that those who had not served on the Committee could have no idea of the amount of labour the Secretaries had to undertake. He had been perfectly astounded at the ease with which Mr. Appleton had attended to his multifarious duties.

The resolution was then put, and most cordially received.

Mr. Appleton, in reply, said it was with very mingled feelings that he gave up his position of Honorary Secretary that evening. At the same time, as it had been in the past, so in the future it would be his humble endeavour to do the best he could for the Association (applause).

The proceedings then terminated.

SEWERAGE OF TOWNS, VILLAGES, AND MANSIONS.

SIR,—The following notes on the mechanical removal of sewage, which was referred to recently in connexion with the visit of the Architectural Conference to the drainage works of the Houses of Parliament, may be of use to some of your readers :—

With a consumption of 50 cubic feet of gas per hour, a 2-h.p. Atkinson's differential air-compressor engine produces per hour,—

3,510	cubic feet of compressed air at 5 lb.	pressure per sq. in.			
1,596	,,	,,	10	,,	,,
948	,,	,,	15	,,	,,
690	,,	,,	20	,,	,,
516	,,	,,	25	,,	,,
360	,,	,,	30	,,	,,

With the above quantities and pressures of compressed air respectively (after deducting for friction, slip, and loss at joints) a Shone's automatic ejector discharges per hour,—

3,475	cubic feet of sewage		11 ft.	6 in.	high.
1,280	,,	,,	23	0	,,
938	,,	,,	34	6	,,
683	,,	,,	46	0	,,
511	,,	,,	57	6	,,
356	,,	,,	69	0	,,

Also, with a consumption of 90 cubic feet of gas per hour, a 4-h.p. Atkinson's engine produces per hour,—

7,800	cubic feet of compressed air at 5 lb.	pressure per sq. in.			
3,540	,,	,,	10	,,	,,
2,112	,,	,,	15	,,	,,
1,536	,,	,,	20	,,	,,
1,152	,,	,,	25	,,	,,
816	,,	,,	30	,,	,,

With the latter quantities and pressures of compressed air respectively (after deducting for friction, slip, and loss at joints) a Shone's ejector discharges per hour,—

7,722	cubic feet of sewage		11 ft.	6 in.	high.
3,505	,,	,,	23	0	,,
2,091	,,	,,	34	6	,,
1,521	,,	,,	46	0	,,
1,141	,,	,,	57	6	,,
808	,,	,,	69	0	,,

As the above particulars have been deduced from actual facts and practical experience, they may be confidently relied on as data for calculations, and the British Gas Engine Company guarantee their engines and compressors to produce the quantities of compressed air as described.

There are many towns, villages, and mansions, both inland and at the seaside, and especially in flat low-lying districts, where the sewage, as it is produced, deposits and stagnates in the drains, sewers, and water-courses. This is caused partly by their bad shape, excessive size, and insufficient fall to make them self-cleansing; and partly by their outlets being drowned in some instances, and tide-locked in others, and so prevented from freely and constantly discharging as they should do. Wherever these conditions exist, the inevitable result is that noxious gases, which often contain the germs of contagious diseases, escape from the decomposing and fermenting sewage deposit into and around the towns, the villages, and the mansions, and the infected air the inhabitants continually breathe. It is owing to these bad conditions that excessive sickness, epidemics, and high death-rates occur; and it was owing to the same conditions, only of a more intensified character than now obtains, that plagues formerly broke out and killed half the populations. Wherever there are stagnant drains and sewers of deposit, whether in a town, a village, or a mansion, facilities are now afforded for easily, economically, and effectually remedying this state of things by the adoption of one or more of Shone's automatic sewage ejectors in combination with one or more of Atkinson's differential air-compression gas engines. The first cost and working expenses of these highly effective and scientific machines are much less than, and far superior to, the old sumptuous process of steam-boilers, steam-engines, and pumps for lifting the sewage. By means of the ejectors and gas-engines as described, which may be seen in full working action at the Palace of Westminster and elsewhere, the sewage, as fast as it is produced, may be lifted to any altitude, whence it would quickly flow by gravitation on to prepared agricultural land for utilisation and purification there; or be discharged above the level of high water down into the sea below the level of low water. If local sanitary authorities would only wisely devote their attention to this subject, the sanitary improvement of their districts may be readily accomplished.

Putney. JOHN PHILLIPS, C.E.

ST. MICHAEL'S, COVENTRY.

SIR,—Will you allow me to point out, with reference to a paragraph which I have observed in the *Builder* about St. Michael's, Coventry [p. 760, May 21st, 1887], that it is not correct to say that the tower and spire have been taken down and built up again from the base? The foundations have been underpinned, the tower is being cased and otherwise strengthened, and the upper part of the spire, some 70 ft., has been taken down, and will be rebuilt. I think the drawing of the tower and spire is by Mr. Webster, the clerk of works. I. S.

*** We never implied that the *tower* had been rebuilt; only the spire. We are obliged to our correspondent for giving the precise extent of the work done.

NELSON COLUMN.

SIR,—The information asked for by one of your correspondents, in the issue of 14th inst., may be found in the *Builder* of April, 1850; at least, a lengthy description of the column, together with one section and a few details. J. L.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

5,189, Imparting Surface Designs to Bricks, Tiles, &c. W. Benson and L. Gunning.

This invention consists in the employment of a rotating roller with the design impressed on its surface. This roller is placed near the mouth of the pugmill, whence the clay in a plastic state issues. The roller is adjustable in its bearings, and cuts as well as stamps the mass of clay as it issues from the mill before being fired.

5,969, Ventilator and Chimney Cowl. J. Rainer.

This invention relates to a cowl or chimney-top fitted with deflector plates in such wise that when the wind strikes the main shaft the air is deflected upwards, carrying with it the smoke. The greater the force of wind the stronger is the upcurrent in the shaft.

6,196, Chimney Cowl. J. B. Fryer.

The cowl which is the subject of this patent has a circular revolving head fixed at the top of the chimney shaft. This revolving head has an inner lining, and also an outer cover or jacket. These parts are so arranged that air can enter the mouth of the chimney and pass between the jacket and the lining, producing a vacuum and causing a strong updraught for the smoke.

6,476, Water Taps. E. Budge.

This invention relates to an apparatus which may be fixed over the seat of any tap, for the purpose of regrinding or refacing it, so that the valve of the tap will fit tightly thereto. Many varieties of cutters may be used, and the little machine is easy of manipulation and quick in its effect.

6,930, Fireplaces, &c. H. Heim.

The object of this invention is to obtain an almost perfect combustion, and consumption of smoke. The fireplace is fitted with a filling channel, closed by a cover, with which the fire-space in the rear communicates. Over or around the fireplace, tubes are fitted for the purpose of conveying the heated air to and from the room in which the fireplace is fixed.

7,630, Sliding Window Sashes. J. H. Betteley.

The object of this invention is retaining the window-sashes in any position, and consists in fixing a rack or series of serrations at the side of the window-sash, and a catch on the window frame which fits into the notches, and will fix the window at any required height. The improvement is also applicable to screens, blinds, &c.

NEW APPLICATIONS FOR PATENTS.

May 13.—7,014, R. Russell, Water-waste Preventers for Flushing Cisterns.—7,027, G. Bateman, Attaching Knobs to Spindles.—7,036, F. Trier, Stoneworking Machines.

May 14.—7,057, T. Boothroyd and S. Brooke, Ventilator.

May 16.—7,113, J. Horne and S. Hollyman, Warming and Ventilating Houses, &c.—7,124, H. Snell, Glazing Windows, &c.

May 17.—7,178, J. Corbett and R. Hardy, Manufacture of Cement.

May 18.—7,217, J. Clarkson and S. Wilkinson, Water-closets.—7,236, J. Warwick, Construction of Water-pipes exposed to the action of frost.—7,243, L. Knemeyer, Cement for Artificial Stonework, Coating Walls, &c.—7,251, H. Lake, Window-sash Fastener.

May 19.—7,275, J. Bird, Automatic Weather-bar.—7,311, R. Livingston, Opening and Closing Casements and Ventilators.

PROVISIONAL SPECIFICATIONS ACCEPTED.

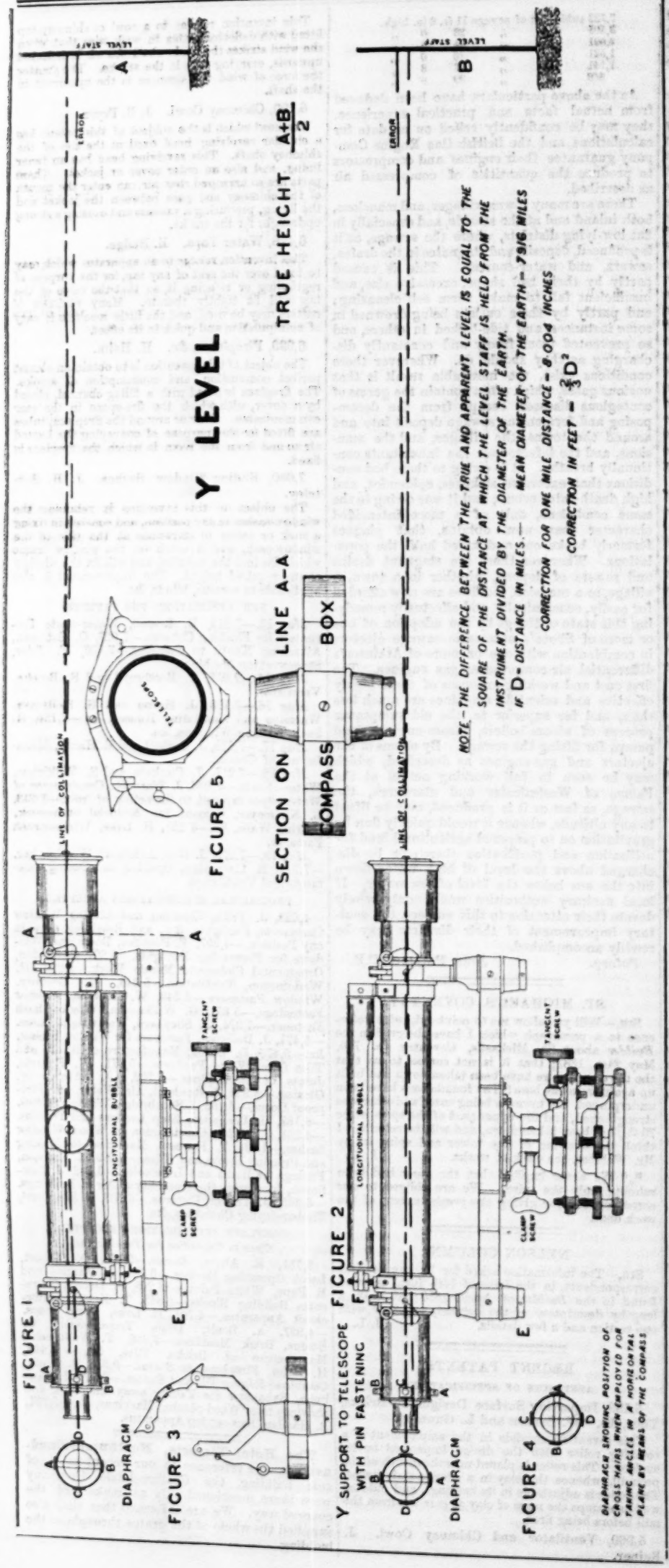
4,623, J. Frith, Opening and Closing Window Casements, Fanlights, &c., and Retaining same in any Position.—4,997, F. Pontifex, Doors and Windows for Preventing Draughts.—5,201, C. Heaton, Ornamental Cloissonné Mosaic Work.—5,229, H. Waddington, Ventilation.—5,346, G. Gregory, Window Fasteners.—5,349, W. Macvitie, Window Fastenings.—5,351, G. Williamson, Window Sash Fastener.—5,374, J. Shepherd, Water-tight Doors.—5,471, J. Dedicoat, Fasteners for Window Sashes, &c.—5,476, D. Burns, Manufacture of Bricks and Tiles from Waste Products.—5,671, W. Roberts, Joints of Drain-pipes.—5,702, J. Armstrong, Glazing.—5,825, J. Rowland, Air, Water, and Fireproof Doors.—6,108, J. Shoebridge, Window Sashes.—6,187, H. Longsdon, Step Ladders and Trestles.—4,261, J. Millar, Construction of Wood Window Sashes.—4,634, T. Fawcett, Machinery for Making and Pressing Bricks and Tiles.—6,309, E. Marston, Fittings for Baths and Lavatories.—6,432, J. Rawlinson, Increasing the Humidity of Air in Buildings.—6,605, J. Tucker, Cisterns.—6,709, G. Shepherd, Timber-drying Chambers, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

8,731, E. Abate, Stoves.—9,150, O. Gilbert, Latch Operating Devices.—9,581, J. Hannay and E. Pape, White Paint.—13,205, J. Denny, Terra-cotta Building Blocks.—2,843, T. Kemp, Water-closet Apparatus.—4,701, H. Lake, Drain Traps.—4,937, A. Boult, Drain Traps.—5,048, C. Emens, Brick Machines.—5,429, F. Wallbrecht, Manufacture of Bricks, Tiles, &c. — 8,643, H. Heim, Fireplaces or Stoves.—9,378, R. Guest, Combined Edging Tile and Gutter.—9,520, J. Rawlings, Exhauster for Taking away the Dust and Shavings from Wood-planing Machines, &c.—5,331, R. Haddan, Saw-setting Apparatus.

The Hotel Victoria, Northumberland-avenue.—In reference to our recent notice of this building, the Coalbrookdale Company were there mentioned only as makers of the covered way. We are informed that they also supplied the whole of the grates throughout the building.


Y LEVEL
TRUE HEIGHT A+B/2
LEVEL STAFF
A
B
ERROR
LINE A–A
BOX
COMPASS
SECTION ON
FIGURE 5
LINE OF COLLIMATION
TELESCOPE
FIGURE 1
LONGITUDINAL BUBBLE
TANGENT SCREW
CLAMP SCREW
DIAPHRAGM
FIGURE 3
Y SUPPORT TO TELESCOPE WITH PIN FASTENING
FIGURE 2
FIGURE 4
DIAPHRAGM SHOWING POSITION OF CROSS HAIRS WHEN EMPLOYED FOR TAKING ANGLES IN A HORIZONTAL PLANE BY MEANS OF THE COMPASS
NOTE.–THE DIFFERENCE BETWEEN THE TRUE AND APPARENT LEVEL IS EQUAL TO THE SQUARE OF THE DISTANCE AT WHICH THE LEVEL STAFF IS HELD FROM THE INSTRUMENT DIVIDED BY THE DIAMETER OF THE EARTH.
IF D = DISTANCE IN MILES.— MEAN DIAMETER OF THE EARTH = 7916 MILES
CORRECTION FOR ONE MILE DISTANCE = 8·004 INCHES
CORRECTION IN FEET = $\frac{2}{3}D^2$

The Student's Column.

FIELD WORK AND INSTRUMENTS.—XXII.

Levelling Instruments.

VI.—THE Y LEVEL.

THE telescope is reversible in its Y supports, end for end, so that it is immaterial in which Y the object-glass end or the eye-piece end is held. The accuracy of the instrument depends upon the line of collimation being coincident with the axis of the telescope and upon the collars being both vertically and horizontally parallel to the telescopic tubes. Fig. 3 illustrates an end view of the Y support, open ready to receive the telescope. Fig. 4 gives an enlarged view of the Y support, showing one of the collars which surround the outer tube of the telescope. In order to test the accuracy of the line of collimation the instrument is set up approximately level and a well-defined distant point observed. If a level staff is held at as great a distance from the instrument as may be found convenient for clearly reading the divisions upon the face of the staff, the height read with the telescope in the position shown in fig. 1 should be the same as the height read when the telescope is revolved vertically round in its bearings 180 degrees, to the position shown in fig. 2. If any difference exists the diaphragm plate must be adjusted by moving the vertical capstan-headed screws near the eye-piece marked A and B in figs. 1 and 2, until the staff reads the same with the telescope in both positions. Before revolving the telescope upon its axis from the position shown in fig. 1 to the position shown in fig. 2, the clamp-screw attached to the body of the instrument should be tightened, and while revolving the telescope let it be observed whether the centre point between the two vertical cross-hairs diverges to the right or left hand of the distant point chosen for observation. Place the telescope, as shown in fig. 4, with the single cross-hair vertical, and observe a distant point. Revolve it 180°, as before, and the total divergence horizontally will then be apparent. Half this amount must then be taken up by working the same capstan-headed screws, A and B, which are now in a horizontal position, in order to correct any error that exists in this direction. The adjustment of the parallel cross-hairs with reference to the single cross-hair is effected by the capstan-headed screws marked C and D.

Next, to make the run of the longitudinal bubble parallel to the axis of the telescope, so that when the longitudinal bubble properly reverses, the line of collimation within the telescope may be set level by it. Unfasten the Y clips and place the telescope exactly over two opposite parallel plate screws. Tighten the clamp screw and set the longitudinal bubble in the centre of its run by the parallel plate screws. Lift the telescope out of the Ys and replace it with the ends reversed, so that the object-glass end would be removed to the left-hand side, and the eye-piece end to the right-side in fig. 1. Then adjust any error that may appear in the level of the longitudinal bubble, half by the two parallel plate screws over which the telescope has been placed, and half by the capstan-headed nut and lock nut marked F, which raise or lower one end of the bubble tube, as required upon its vertical screw-attachment to the telescope. Having done this, we have in the third place to set the axis of the telescope at right angles to the vertical axis of the instrument, so that the line of collimation may traverse in a horizontal plane. This is effected with the telescope fixed in the Ys, as shown in fig. 1. The clamp screw is slack, and the longitudinal bubble set level with the telescope placed over two opposite parallel plate screws. The instrument is then turned half round upon its vertical axis, so that the contrary ends of the telescope and the Y supports have changed places over the same two parallel plate screws. If the bubble is not found to settle in the centre of its run after traversing half round horizontally, half the error must be corrected by the two parallel plate screws over which the telescope has been placed, and the remaining half by the capstan-headed nut marked E attached to the Y shown in the illustration under the horizontal bar next the eye-piece. This adjustment determines the relation of the bubble to the Y supports in one direction. The operation should also be performed over the other two parallel plate screws with the telescope horizontally at right

angles to the last direction, and repeated over both directions, until the bubble remains in the centre of its run during a complete traverse of the telescope. When once in order the instrument will remain in adjustment, unless shaken by severe handling in transit by carriage from one place to another.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

MAY 13.

By Messrs. COBB.

Margate—An enclosure of freehold land, 4a. 2r. 12p. £1,700
The Twenties Farm, 45a. 1r. 16p., freehold..... 3,300

MAY 16.

By S. B. CLARK & SON.

Portland Estate—10, Devonshire-street, 28 years, ground-rent 50*l*..... 1,300

By FULLER, MOON & FULLER.

Sutton—96 to 102, even, High-street, freehold 6,720
Benhilton-road—the freehold houses called Bella Donna 730

By G. COOMBER.

Clapham—121, Fentiman-road, 83 years, ground-rent 10*l*. 540
125, 127, and 129, Fentiman-road, 83 years, ground-rent 30*l*. 1,635

By G. BRINSLEY.

Peckham—Ground-rent of 12*l*., reversion in 7 years..... 530
Ground-rent of 8*l*., reversion in 9 years 575

By W. R. NORRIS.

Chelsea—8, Redburn-street, 65 years, ground rent 7*l*. 10s..... 550

By PROCKTER & FRASER.

Bethnal Green—Green-street, Lord John Russell beerhouse, freehold..... 1,950
1 and 3, Sydney-street, freehold 520
221, Green-street, freehold 475

By A. G. THOMSON & Co.

Westminster—the lease of 52 and 53, York-street, term 11 years..... 300

MAY 17.

By DRIVER & PREFECT.

High Barnet—1 and 2, Prussia Cottages, freehold.. 750

By BOYTON & PEGRAM.

Fulham—13, Pownall-road, freehold 315

By CHINNOCK, GALSWORTHY, & Co.

Knightsbridge-road—Freehold site, containing an area of 24,697 feet 34,050

By Messrs. FOSTER.

Chelsea—34, Carlyle-square, 76 years, ground-rent 8*l*. 8s. 1,100

By GREEN & SON.

Kingston—9, High-street, with the distillery, plant, and stabling, freehold..... 3,100

By H. RUTLEY.

Portland Estate—4, Bolsover-street, 16 years, ground-rent 16*l*. 370
100 and 101, Bolsover-street, 12 years, ground-rent 40*l*. 800
Hampstead-road—69, William-street, 36 years, ground-rent 4*l*. 10s..... 750
Clapham-road—13 and 15, Willington-road, 58 years, ground-rent 21*l*. 420

By DEBENHAM, TEWSON, & Co.

Tunbridge Wells—34, Broadwater Down, 72 years, ground-rent 5s..... 5,750
Notting Hill—1, 2, and 3, Castle-terrace, 74 years, ground-rent 79*l*. 10s. 7,720
Blackfriars-road—No. 208, freehold 3,040

MAY 18.

By W. W. JENKINSON.

Jamaica—The Prospect, sugar plantation, 1,724 acres..... 2,850

By J. & R. KEMP.

Maida Vale—Improved ground-rent, 42*l*., term 73 years..... 860

By J. A. SMITH.

Hammersmith—10 and 11, Blythe-road, 78 years, ground-rent 16*l*. 875

By FLEURET & SON.

Clerkenwell—9, Vineyard-walk, 38 years, ground-rent 8*l*..... 260

By J. M. GRAHAM.

Potter's Bar—1 to 6, Osborne-cottages, 63 years, ground-rent 32*l*. 300

By HARMAN BROS.

Barnsbury—104, Brewery-road, 62 years, ground-rent 5*l*..... 400
Brondesbury—1 and 5, St. John's-terrace, 72 years, ground-rent 20*l*. 870

By FARRERBROTHER, ELLIS, & Co.

St. James's—12, Cleveland-row, freehold..... 4,000
Poplar—Improved ground-rents, 17*l*. 4s., term 54 years..... 240
Improved ground-rents, 23*l*., term 54 years..... 310
110, 112, and 114, Manchester-road, 54 years, ground-rent 12*l*. 450
138 to 144, even, Manchester-road, 54 years, ground-rent 16*l*. 745
6, Brig-street, 54 years, ground-rent 1s. 145

MAY 19.

By BROWN, ROBERTS, RADMALL, & Co.

Brunswick-square—No. 32, and stabling, 11 years, ground-rent 25*l*. 625
South Norwood—The residence called Hollington, 79 years, ground-rent 26*l*. 1,500

By BEADEL & Co.

Enfield—Durant's Arbour Estate, 139a. 2r. 33p., freehold 19,000
City of London—59, Watling-street, freehold..... 4,500
60, Watling-street, freehold 4,850
Long Acre—6 and 8, Castle-street, term 5,000 years, no ground-rent 1,500

By GLASIER & SONS.

Soho—44, Dean-street, freehold 1,880
Pimlico—62, Warwick-street, 47 years, ground-rent 9*l*..... 1,050

By DEBENHAM, TEWSON, & Co.

Sydenham—Peak Hill Lodge, and 6¼ acres, 16 years, ground-rent 50*l*. 5s. 700
Bethnal Green—23, Patriot-square, freehold £425
Goswell-road—18, 19, and 20, Gee-street, freehold... 1,450

By INMAN & Co.

Kilburn—271, High-road, 43 years, ground-rent 5*l*. 17s. 1d. 470

W. W. JENKINSON.

Shooter's Hill—1 and 2, Albion-cottages, and 1, 2, and 3, Hillside-cottages, and a ground-rent of 2*l*. 5s., 75 years, ground-rent 11*l*..... 675
2, Ordnance-terrace, 38 years, ground-rent 18*l*.... 60

By R. F. ROBERTS.

Forest Hill—190, 192, and 194, Devonshire-road, freehold 1,270
Enfield—An enclosure of freehold land, 7a. 2r. 24p. 860

By E. STIMSON.

Old Kent-road—Nos. 114 and 116, and 14 and 15, Clarence-street, 11¼ years, ground-rent 41*l*..... 500
Walworth—5, 7, and 9, Liverpool-street, and a ground-rent of 5*l*., 4¼ years, ground-rent 20*l*.... 135
165 and 167, Lorrimore-road, 35 years, ground-rent 10*l*. 500
Kennington—18, Faunce-street, 77 years, ground-rent 6*l*..... 300
Borough—2 to 7, Ann's-place, 50 years, ground-rent 25*l*. 1,100
Wandsworth-road—48 to 51, Camellia-street, 46 years, ground-rent 16*l*. 1,200
Bermondsey—218 and 220, Alderminster-road, 50 years, ground-rent, 10*l*. 350
140, Long-lane, and a ground-rent of 20*l*. 12 years, ground-rent 12*l*. 250
West Dulwich—9, Park-road, freehold 440

By NEWBON & HARDING.

Camden Town—121, Camden-street, 45 years, ground-rent 6*l*. 565
Kentish Town—84, Castle-road, 76 years, ground-rent 7*l*. 305
Clerkenwell—76, Rosoman-street, 23 years, ground-rent 3*l*. 15s. 265
Barnsbury—27 and 29, Dorinda-street, freehold ... 815
Haggerston—Whiston-street, the Pine Apple beer-house, freehold 1,100
Kingsland—142, Culford-road, 36 years, ground-rent 3*l*. 10s. 285
Dalston—7, Broke-road, 59 years, ground-rent 4*l*.... 295
Hackney-road—93, 95, and 97, Boston-street, 22 years, ground-rent 4*l*. 375
Somers Town—129, 133 to 139, odd, and 145, Ossulston-street, 33 years, ground-rent 30*l*..... 1,180

By FULLER, HORSEY, SONS, & CASSELL.

Poplar—the lease of 70, Chrisp-street, term 3 years 50
Shoreditch—the lease of 25, Kingsland-road, term 10 years 50
Clerkenwell—the lease of 36, Corporation-row, term ¼ year 10
Tower Hill—the lease of 7, Sparrow-corner, term 6 years 100
Southwark Bridge-road—No. 31, freehold 800
5, 6, 7, and 8, Bridge-place, freehold..... 1,360
Borough—79, Union-street, 21 years, rent 50*l*. 55
Drury-lane—No. 107, freehold..... 800

MAY 20.

By HORNE, SON, & EVERSFIELD.

Penge—Croydon-road, thirty-four detached houses, the Goldsmith Arms, and saw-mills, 75 years, ground-rent 250*l*. 2,100
Maida Vale—Warington-crescent, improved ground-rents of 360*l*. a year, term 72 years..... 6,580

By ROBERT REID.

King William-street, E.C.—Improved ground-rent of 310*l*. a year, 37 years 5,500
Notting Hill—42 and 44, Lansdowne-road, freehold 1,960
Bryanstone-square—3, William's-mews, 17 years, no ground-rent 340

By W. & F. HOUGHTON.

Finsbury Park—144, Stroud Green-road, 80 years, ground-rent 7*l*. 10s..... 500
Fulham—21, Elthiron-road, 92 years, ground-rent 6*l*..... 325

By NORTON, TRIST, GILBERT, & Co.

Hersham—Vine Cottage and two other cottages, freehold 895
Upton, Essex—Ground-rent of 5*l*., reversion in 95 years..... 100

By ELLIS & SON.

Clapham-road—Nos. 261 to 273, odd, 1 to 11, Lingham-street, and 1 to 15, Northall-street, freehold 6,500

By BAKER & SONS.

Finchley—Forty-three plots of freehold land 2,455
Kew—4, Cambridge-terrace, copyhold 300
Finsbury Park—24, 31, and 33, Adolphus-road, 86 years, ground-rent 33*l*. 12s. 1,225
28, Alexandra-road, 71 years, ground-rent 12*l*. 12s. 335
9, Gloucester-road, 72 years, ground-rent 8*l*. 8s. . 820

By PROTHEROE & MORRIS.

Loughton—Holly Cottage, with grounds, freehold... 690
Buckhurst Hill—1 to 6, Turner's-cottages, freehold 780
Rhine Cottage, with stabling, freehold 530
Two freehold houses, with shops adjoining 1,220
Victoria-road, Bridge House, freehold..... 610
High-road, two detached houses, freehold 535
Forest Gate—47 and 49, Suffolk-street, freehold ... 650

Railway and Canal Traders' Association.—At a special meeting of the Council of the Railway and Canal Traders' Association, held at the offices of the Association, East-cheap, on the 23rd inst., it was decided to hold the annual general meeting of the Association at the Cannon-street Hotel, on Monday, the 13th of June, at half-past two p.m. The Railway and Canal Traffic Bill as sent down from the House of Lords was considered, and it was resolved:—"That the Council of this Association fully concur with Sir Bernhard Samuelson's motion, to the effect that no Bill for the better regulation of railway and canal traffic will be satisfactory which does not afford adequate protection to traders and agriculturists against undue charges for terminals, and undue preferences, and will give the same their heartiest support."

MEETINGS.

SATURDAY, MAY 28.

Architectural Association.—The first Vacation Visit will be made to Woolpits, the residence of Mr. Henry Doulton. (See Advertisement on p. xvi.)

Association of Public Sanitary Inspectors.—Meeting at Town-hall, Eastbourne. 11 a.m. During the day addresses and papers will be given by Mr. Edwin Chadwick, C.B., Dr. Alfred Carpenter, and others, and visits will be made to the water-works, sewage-works, &c.

WEDNESDAY, JUNE 1.

British Archæological Association.—(1) Mr. J. Romilly Allen, F.S.A. (Scot.), on "The Antiquity of Fonts." (2) The Rev. Dr. Hooppell on "The Excavations at Vinovia." Part II. 8 p.m.

THURSDAY, JUNE 2.

Royal Archæological Institute.—(1) Mr. G. L. Gomme, F.S.A., on "Evidence of a one Village Community at Aston in Oxfordshire." (2) The Rev. A. H. Sayce on "A Hittite Cylinder and Seal." (3) Mr. E. Peacock, F.S.A., on "Court Rolls of the Manor of Hibbaldstow." 4 p.m.

SATURDAY, JUNE 4.

Association of Municipal and Sanitary Engineers and Surveyors.—Home Counties District Meeting at Portsmouth. Paper by Mr. Boulnois on the Drainage Works of Portsmouth, recently carried out by Sir Frederick Bramwell.

Miscellanea.

Royal Meteorological Society.—At the last monthly meeting of this Society, held last week, at the Institution of Civil Engineers, 25, Great George-street, Mr. W. Ellis, F.R.A.S., President, in the chair, Mr. W. Marriott read a paper giving the "Results of Thermometrical Observations made at 4 ft., 170 ft., and 260 ft. above the ground at Boston, Lincolnshire, 1882–86," by Mr. W. Marriott, F.R. Met. Soc. These observations were made on Boston Church tower, which rises quite free from any obstructions, in a very flat country, to the height of 273 ft. A Stevenson screen, with a full set of thermometers, was placed 4 ft. above the ground in the churchyard; a similar screen and thermometers were fixed above the belfry, at 170 ft. above the ground; while a Siemens electrical thermometer was placed near the top of the tower, the cable being brought down inside, and attached to a galvanometer on the floor of the church, where the indications were read off. The results showed that the mean maximum temperature at 4 ft. exceeds that at 170 ft. in every month of the year, the difference in the summer months amounting to 3°; while the mean minimum temperature at 4 ft. differs but little from that at 170 ft.; the tendency, however, being for the former to be slightly higher in the winter and lower in the summer than the latter. As the electrical thermometer was read usually in the daytime, the results naturally showed that the temperature at 4 ft. during the day hours was considerably warmer than at 260 ft. The author, however, detailed several sets of readings which had been made during the night as well as the day, the results from which were of a very interesting character. During the evening the President made a presentation to Dr. J. W. Tripe of a silver tea and coffee service, which had been subscribed for by the Fellows in acknowledgment of the many services which he had rendered to the Society during a period of over thirty years.

A New Lunatic Asylum for Middlesex.—A limited competition has been held for the erection of a fourth lunatic asylum for the county of Middlesex, the architects invited to compete having been Messrs. Giles & Gough (London), Griffiths (Stafford), G. T. Hine (Nottingham), Littler (Manchester), and Martin & Chamberlain (Birmingham). A committee, formed from the Managing Committees of Hanwell, Colney Hatch, and Banstead Asylums, six from each committee, and presided over by Mr. Gaddesden (the Chairman of the Banstead Asylum Committee) gave full consideration to the plans, and selected that by Mr. G. T. Hine. The hospital, which is exceedingly well planned for its purpose, furnishes accommodation for patients under four main groups:—Infirmary patients, 240 males, 291 females; acute cases, 150 males, 252 females; epileptic cases, 161 males, 180 females; chronic cases, 251 males, 360 females. The buildings, as may be supposed, are of great extent; the central block includes administration chapel, recreation-room, cooking and laundry departments, the main corridors run out obliquely on either side, the wards for infirmary and acute cases opening *en echelon* from the outer sides of the corridors, and the wards for chronic and epileptic cases being between the outer corridors and the centre block. Each of these departments has its own airing-court.

Civil and Mechanical Engineers' Society.—The Annual Dinner of this Society was held at the Holborn Restaurant on the 18th inst. The President, Mr. E. H. G. Brewster, A.-M.I.C.E., occupied the chair, and a large number of members and visitors were present, among whom were Professor Henry Robinson (President of the Society of Engineers), Mr. S. H. Terry (of the Local Government Board), and Mr. Worby Beaumont (of the *Engineer*). The usual loyal toasts having been duly honoured, Mr. S. H. Terry proposed "Success to the Civil and Mechanical Engineers' Society," coupled with the health of the President. The President responded, and in the course of his remarks referred to one of the main features of the Society, viz: the cultivation of the spirit of friendship amongst the members one with another, each new member being taken in hand by the older members and introduced to all those he might be unacquainted with. Other toasts followed, and a very pleasant evening was spent.

The County Grant and Wood Paving on Main Roads.—The Chiswick Local Board some time ago intimated to the County Authorities for Middlesex that it had passed a resolution in favour of laying the Chiswick High-road, from Young's-corner to Kew Bridge, with wood paving, and asking the Authorities to make the usual grant in aid of the expenses of maintenance and repair of the road proposed to be laid with wood paving. At a recent meeting of the Local Board it was reported that the County Authorities had declined to accede to the application of the Chiswick Board, not on the ground, it is believed, of any unfavourable opinion with regard to the character of wood paving for main road purposes, but because the Justices are of opinion that the Highways Act does not enable them to contribute to the expenses of maintenance where part of these expenses are in the shape of interest on a loan borrowed for the complete re-laying of the road with wood. Such interest, the County Authorities contend, is not "current expenses." The Chiswick Board, in order to get over this difficulty, advertised for tenders on the basis of paying to the contractor a lump sum annually for construction at the beginning of the period, and maintenance afterwards for a certain number of years, so that the Board could obviate the necessity of borrowing to meet at once the cost of construction. The County Authorities even then regard the transaction as tantamount to borrowing money, for they would be paying a grant every half-year of something like 1,000*l*., when for the first two or three years of the contract term the current expenses incurred on the road would be comparatively trifling. The Chiswick Board, however, have appointed a deputation to wait on the Local Government Board to protest against the decision.

London Sewage.—At the meeting of the Metropolitan Board of Works, on the 13th inst., some further information was vouchsafed to the public in regard to the system of sewage disposal to which the Board has at last committed itself. The proposed system cannot produce a proper purification of the river. Even if it turns out that this is the best of all possible purification schemes, that the effluent is "fairly clear," and that the sludge and cake will produce no local nuisance, it still remains a fact that the situation of the works is utterly unsuitable. It seems to us doubtful, to say the least of it, whether chemical and mechanical operations upon the sewage of four million persons can be conducted without serious local injury, or at least annoyance; and we are certain that the effluent water, although much less objectionable than raw sewage, is unfit to be thrown into the Thames at the existing outfalls. At present, according to the Royal Commissioners, who had ample evidence before them, the river is polluted with sewage almost up to Teddington. The pollution will now be of a less disgusting character, but still it will remain a disgraceful pollution, to which the people of London ought not to submit. We have always maintained that the proper place for the treatment of London sewage is in Sea Reach, where there are large tracts of land for sewage irrigation, low lands to be raised, no houses to be incommoded, a large volume of water, and close proximity to the sea. To this remedy we shall surely come sooner or later, and then it will be found that the vast expenditure for works and steamers now lightly incurred by the Metropolitan Board of Works will have been absolutely thrown away.—*Lancet*.

Liverpool Engineering Society. — On Saturday last the members of this Society, by permission of Mr. W. King, M.Inst.C.E., visited the United Gas Light Company's Works at Linacre. Arriving at the works at about 2·30 p.m., the party were met by Mr. King, who took them to the office, where he showed them the plans and gave a short history of the growth of the works. He then pointed out the extensions in progress, and those contemplated, and stated that the capacity of the works when completed would be equal to a supply of about 17 millions of cubic feet of gas per day. The party then proceeded, under the guidance of Mr. King, to inspect the works, where the various operations of retorting the coal and purifying and testing the gas were examined with much interest. The members then returned to the office, where they were entertained to luncheon by Mr. King. A hearty vote of thanks to Mr. King brought the visit to a close.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....load	8 0 0	13 0 0
Sequoia, U.S. ....foot cube	0 2 3	0 3 0
Ash, Canada ....load	3 0 0	4 10 0
Birch ,, ...	2 0 0	3 10 0
Elm ,, ...	3 10 0	4 10 0
Fir, Dantsic, &c.	1 10 0	4 0 0
Oak ,, ...	2 10 0	4 10 0
Canada	3 0 0	6 0 0
Pine, Canada red	3 0 0	3 10 0
,, yellow	2 10 0	4 10 0
Lath, Dantsic ....fathom	3 0 0	5 0 0
St. Petersburg	4 0 0	5 10 0
Wainscot, Riga ....log	0 0 0	0 0 0
,, Odessa, crown....	2 15 0	3 0 0
Deals, Finland, 2nd and 1st...std.100	7 0 0	8 0 0
,, 4th and 3rd	5 10 0	6 10 0
Riga	5 10 0	7 0 0
St. Petersburg, 1st yellow	8 0 0	13 0 0
,, 2nd ,, ...	7 0 0	8 0 0
,, white	6 10 0	8 10 0
Swedish	6 0 0	15 0 0
White Sea	7 0 0	16 10 0
Canada, Pine, 1st	16 0 0	24 0 0
,, ,, 2nd....	10 0 0	15 0 0
,, ,, 3rd, &c....	6 0 0	9 0 0
,, Spruce, 1st	8 0 0	9 0 0
,, ,, 3rd and 2nd	5 0 0	7 0 0
Deals—New Brunswick, &c.	5 0 0	6 10 0
Battens, all kinds	4 0 0	10 10 0

TIMBER (*continued*).	£. s. d.	£. s. d.
Flooring Boards, sq., 1 in., prepared, First	0 8 0	0 11 0
Second	0 6 6	0 7 6
Other qualities	0 5 0	0 6 0
Cedar, Cuba ....foot	0 0 3	0 0 3½
Honduras, &c.	0 0 2½	0 0 3½
Australian	0 0 2	0 0 3
Mahogany, Cuba	0 0 4	0 0 7
St. Domingo, cargo average	0 0 4	0 0 6
Mahogany, Mexican, cargo av.	0 0 3½	0 0 4
Tobasco ,, ...	0 0 4	0 0 5½
Honduras ,, ...	0 0 3½	0 0 5½
Maple, Bird's-eye	0 0 6	0 0 8
Rose, Rio ....ton	0 0 0	0 0 0
Bahia....	0 0 0	0 0 0
Box, Turkey ....ton	5 0 0	12 0 0
Satin, St. Domingo ....foot	0 0 5	0 0 10
Porto Rico	0 0 6	0 0 10
Walnut, Italian	0 0 4	0 0 5
METALS.		
IRON—Bar, Welsh, in London...ton	4 7 6	4 15 0
,, ,, in Wales	4 2 6	4 7 6
,, Staffordshire, London	5 10 0	6 0 0
Sheets, single, in London	6 15 0	8 10 0
Hoops ,, ...	6 0 0	7 0 0
Nail-rods ,, ...	5 15 0	6 10 0
COPPER—		
British, cake and ingot ....ton	42 10 0	43 0 0
Best selected	44 5 0	44 15 0
Sheets, strong....	50 0 0	0 0 0
Chili, bars	39 0 0	39 10 0
YELLOW METAL ....lb.	0 0 0	0 0 0
LEAD—		
Pig, Spanish ....ton	12 2 6	0 0 0
English, common brands....	12 7 6	0 0 0
Sheet, English	13 7 6	13 12 6
SPELTER—		
Silesian, special ....ton	14 7 6	14 10 0
Ordinary brands....	14 5 0	14 7 6
TIN—		
Straits....ton	103 0 0	0 0 0
Australian	103 0 0	0 0 0
English ingots	106 5 0	0 0 0
ZINC—		
English sheet ....ton	0 0 0	0 0 0
OILS.		
Linseed ....ton	21 10 0	21 15 0
Cocoanut, Cochin	31 0 0	33 0 0
Ceylon	23 10 0	0 0 0
Palm, Lagos	21 0 0	21 10 0
Rapeseed, English pale	22 5 0	22 10 0
,, brown	21 0 0	0 0 0
Cottonseed, refined	19 10 0	20 10 0
Tallow and Oleine	25 0 0	45 0 0
Lubricating, U.S.	5 0 0	6 0 0
,, refined	5 0 0	12 0 0
TURPENTINE—		
American, in casks ....cwt.	1 8 0	0 0 0
TAR—		
Stockholm ....barrel	0 15 0	0 0 0
Archangel	0 12 0	0 0 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Town-hall, Downham Market....	The Committee	*5l.*	June 14th	i.
New Market Hall	Ludlow Town Council...	20*l*., 15*l*., and 10*l*....	June 30th	i.
Laying-out Cemetery, &c., Oldham....	Cemeteries Com....	60 gs. and 30 gs.....	July 2nd	i.
Cottage Hospital	....	Not stated	Not stated ...	i.
Monument	St. Anne's-on-Sea L. Bd	Gratuitous	do.	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Rebuilding Royal Infirmary, Liverpool	The Committee....	A. Waterhouse....	May 30th	i.
Supply of Road Materials	Lewisham Bd. of Works	*Official*	May 31st	ix.
Waterworks....	Northwich Local Board	H. Bancroft	do.	ii.
Tanks for Laundry....	Lambeth Guardians	*Official*	June 1st	ii.
Additions and Alterations	Edgbaston Deaf and Dumb Institution...	B. Corser	June 4th	ii.
Additions, &c., to Schools	Guildford School Board	S. Welman....	do.	ii.
Alterations, &c., to Cator Estate Office	Beckenham Local Brd.	G. B. Carlton....	June 6th	ii.
Kerbing and Brick Paving....	do.	do.	do.	ii.
Oak Cleft Fencing and Dwarf Wall	do.	do.	do.	ii.
Main Drainage Works	Finchley Local Board	G. W. Brumell....	do.	ii.
Erection of Markets, &c....	Carlisle Cor....	Cawston & Graham	do.	ii.
Scavenging, Dusting, and Street Cleansing ...	Hornsey Local Board...	T. De Courcy Meade ...	do.	ii.
Cleaning and Whitewashing	Chelsea Guardians	*Official*	do.	ii.
Making-up and Paving Roads	Wandsworth Bd. of Wks	do.	June 7th	ix.
Supply and Erection of Tank, &c.	Acton Local Board.....	do.	do.	ix.
Paving	Brentford Local Board	— Lacey	do.	ii.
Drainage Works....	Cheshunt Local Board	T. Bennett	June 8th	ii.
Road-making and Paving Works	Hammersmith Vestry...	*Official*	do.	ix.
Supply of Broken Granite and Kentish Flints	Barking Town Local Bd	C. J. Dawson....	June 9th	ix.
School for Boys	Governors, Williams's Schools, Caerleon ...	E. A. Lansdowne....	June 10th	ix.
Wood-Paving and Patent Glazing	Huddersfield Cor.	R. S. Dugdale	June 11th	ii.
Kerbing Footpaths	Chelmsford Local Bd....	C. Pertwee....	June 13th	ii.
Levelling, Kerbing, and Surface Draining.....	Kingston-upon-Thames Corporation....	*Official*	do.	ix.
Repairing and Painting Fencing, &c.	Metro. Board of Works	do.	June 14th	ix.
Widening, &c., of Glasgow Bridge	City of Glasgow....	Miller & Bell....	June 15th	ii.
Laundry and Receiving Wards	Paddington Guardians ..	A. & C. Harston	June 21st	ix.
Various Works	Schl. Board for London	*Official*....	Not stated...	ix.
Painting, &c., Works, Portsmouth	War Department.....	do.	do.	ii.
Erection of a House	....	F. L. Pither	do.	ix.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Borough Surveyor....	King's Lynn Cor.....	250*l*., &c.	May 30th	xvi.
Head Master	Londonderry Sch. of Art	Not stated	June 4th	xvi.
Clerk of Works	Llantwitfardre Sch. Bd.	do.	June 6th	xvi.
Surveyor	Cor. of Gravesend.....	200*l*. per annum.....	June 8th	xvi.

TENDERS

ANGLESEY.—For work on Holyhead and Shrewsbury-road. Mr. W. E. Jones, C.E., County Surveyor:—

Hugh Morris, Malltraeth (accepted)	£107	0	0

CAMBERWELL.—For the erection of thirty-three houses, Cobourg-road, for Messrs. R. White & Sons. Mr. C. W. Lovett, architect:—

Higgs & Hill	£18,640	0	0
W. Smith	17,787	0	0
Burman & Son	17,777	0	0
C. Cox	17,480	0	0
Nightingale	17,452	0	0
Howell & Son	16,933	0	0
Kearly	16,848	0	0
Heathfield	16,818	0	0
Rider & Son	15,920	0	0
Downs	15,742	0	0
H. T. Holloway	15,573	0	0
W. & F. Croaker (accepted)	15,534	0	0

CANNOCK (Staffordshire).—For additions to Board School, Walsall-road, Cannock, for 230 boys. Mr. Fred. W. Evans, architect, 83, High-street, Birmingham. Quantities by the architect:—

C. Linford, Cannock	£1,690	0	0
A. Gilbert, Penkridge	1,649	0	0
John Roberts, Cannock	1,635	0	0
T. H. Kent, Cannock	1,620	0	0
Wm. Ingram, Cannock	1,595	0	0
J. Reynolds, Cannock	1,513	0	0
Bradney & Co., Wolverhampton	1,495	0	0
Robert Barton, Hednesford	1,490	0	0
A. F. Whittome, Stafford	1,469	0	0
John Inwood, Malvern	1,460	0	0
Samuel Wotton, Bloxwich	1,453	0	0
Jones & Son, Wolverhampton	1,450	0	0
W. D. Anderson, Cannock	1,427	0	0
Horsley Bros., Birmingham	1,393	0	0
J. H. Bate, Dudley	1,361	0	0
Dorse & Son, Cradley Heath*	1,195	0	0

* Accepted.

CHELSEA.—For pulling down and re-erecting the covered playground for girls and infants at Park-walk School (Chelsea O), for the School Board for London. Mr. T. J. Bailey, architect:—

C. Wall	£668	0	0
C. F. Kearley	647	0	0
W. Oldrey & Co.	600	0	0
J. Garlick	600	0	0
T. Bendon	593	0	0
W. Johnson*	590	0	0

* Recommended by the Works Committee for acceptance.

CHELSEA.—For the enlargement of the Everington-street School (Chelsea T¹), by 200 places, for the School Board for London. Mr. T. J. Bailey, architect:—

G. Lyford	£3,183	0	0
H. L. Holloway	2,700	0	0
C. Wall	2,605	0	0
J. Garlick	2,604	0	0
W. Oldrey & Co.	2,593	0	0
H. Hart	2,573	0	0
Leslie & Knight	2,567	0	0
W. Johnson*	2,494	0	0

* Recommended by the Works Committee for acceptance.

CHELSEA.—For alterations and additions to the Stanley Arms, King's-road, Chelsea, for Mr. Rheim. Mr. J. W. Brooker, architect:—

Smith & Son	£1,369	0	0
W. Downs	1,247	0	0
Mark	1,239	0	0
Jackson & Todd	1,220	0	0
Croaker	1,176	0	0
Batley	1,098	0	0
W. Royal & Co. (accepted)	1,040	0	0

CHISLEHURST.—For the conversion of the premises known as the Coffee Tavern, Chislehurst, Kent, into two separate dwellings, with shops, for Mr. Owen Edwards. Mr. E. W. Brooking, architect, 44, Finsbury-circus, E.C.:—

W. A. Grubb, Bromley	£950	0	0
J. Otway, Chislehurst	860	0	0
M. Marsland, Chislehurst	763	0	0
D. Payne, Bromley	665	0	0
F. Wood, Chislehurst	643	0	0
B. J. White & Son, Chislehurst*	632	0	0

* Accepted.

EALING.—For public offices, &c., for the Ealing Local Board. Mr. Charles Jones, architect. Quantities supplied:—

Prestige & Co.	£25,200	0	0
Priestley & Gurney	24,400	0	0
Scrivener & Co.	23,991	0	0
B. E. Nightingale	23,930	0	0
Brass & Son	23,500	0	0
F. & H. Higgs	23,500	0	0
H. Haynes	23,000	0	0
Martin Wells & Co.	23,000	0	0
C. Wall	22,561	0	0
T. Turner & Co.	22,500	0	0
C. Claridge	22,485	0	0
J. Marsland	22,345	0	0
Adamson & Son	22,084	0	0
Howell & Son	21,843	0	0
W. H. Waters	21,822	0	0
A. & E. Braid	21,675	0	0
J. T. Chappell	21,286	0	0
S. R. Turtle	21,141	0	0
W. Shepheard	20,498	0	0
H. Knight (accepted)	20,430	0	0

FINSBURY.—For enclosing, draining, and tar-paving the additional land recently acquired by the School Board for London, for the Montem-street School (Finsbury BB¹). Mr. T. J. Bailey, architect:—

Wall Bros.	£1,125	0	0
T. Bendon	890	0	0
C. Wall	880	0	0
W. Johnson	870	0	0
G. S. Pritchard & Son*	789	0	0

* Recommended by the Works Committee for acceptance.

FOREST GATE.—For new Wesleyan schools, Forest Gate, E. Mr. F. Boreham, architect, Finsbury Pavement. Quantities by Mr. C. W. Brooks:—

G. J. Hosking	£3,289	0	0
Perry & Co.	3,198	0	0
T. W. Haylock	3,050	0	0
J. Grover & Son	3,040	0	0
L. H. & R. Roberts	3,027	0	0
J. Woodward	3,015	0	0
Dove Bros.	2,985	0	0
J. Catley	2,973	0	0
Prout	2,965	0	0
J. Morter	2,931	0	0
R. J. Battley	2,915	0	0
J. Holloway	2,910	0	0
J. Chessum	2,900	0	0
J. Allen & Sons	2,880	0	0
G. Sharp	2,850	0	0
E. Palmer	2,832	0	0
A. Eaton & Co.	2,798	0	0
W. Gregar (accepted)	2,746	0	0

HAMMERSMITH.—For alterations and additions at the Royal Sussex Hotel, Broadway, Hammersmith, for Mr. E. A. Young. Messrs. Alexander & Gibson, architects, 40, Great James-street, Bedford-row:—

Patman & Fotheringham	£2,500	0	0

[No competition.]

HIGHBURY.—For the erection of a stable and coach-house, &c., at the rear of No. 35, Compton-terrace, for Mr. J. Davis. Mr. John Hudson, architect, Leman-street:—

J. Green	£320	0	0
L. Griffin	309	0	0
W. Gladding	289	0	0
Bishop & Webb	278	0	0
Coulsell Bros., Bethnal Green*	274	0	0

* Accepted.

HOXTON.—For adapting the schoolkeeper's existing rooms in connexion with the Canal-road School, Hoxton, as an additional class-room for forty-seven infants, enclosing, draining, and tar-paving the additional land acquired by the Board, for erecting a new house for the schoolkeeper, with a cookery class-room underneath, and carrying out the additions and improvements to the existing school, for the School Board for London. Mr. T. J. Bailey, architect:—

J. Derry	£4,004	0	0
W. M. Dabbs	3,942	0	0
T. Taylor	3,740	0	0
G. S. Pritchard & Son	3,719	0	0
C. Wall	3,689	0	0
J. Holland	3,632	0	0
Wall Bros.	3,486	0	0
H. L. Holloway	3,473	0	0
W. Oldrey & Co.	3,448	0	0
H. Hart	3,377	0	0
W. Johnson*	3,362	0	0

* Recommended by the Works Committee for acceptance.

HUDDERSFIELD.—For ironwork for the Wholesale Market, for the Corporation of Huddersfield. Drawings and specification prepared by Mr. R. S. Dugdale, M. Inst. C.E., Borough Surveyor:—

Dyne, Steel, & Co., Newport	£7,055	0	0
Arrol Bros., Glasgow	6,685	17	4
R. Dempster & Sons, Elland	6,110	0	0
Tyne Boiler Works Co., Newcastle-on-Tyne	6,005	16	10
Robertson & Co., Workington	6,000	0	0
James McMillan, Glasgow	5,930	0	0
Municipal Appliances Co., Bamber Bridge	5,620	16	2
Morewood & Co., Birmingham	5,620	4	8
Tees Side Iron and Engine Works Co., Middlesbrough	5,315	17	7
Pearson & Knowles, Coal and Iron Co., Warrington	4,990	0	0
F. Braby & Co., Glasgow	4,941	0	0
Head, Wrightson, & Co., Stockton-on-Tees	4,895	0	0
South Staffordshire Iron Roof and Bridge Co., Darlaston	4,800	10	0
A. Handyside & Co., Derby	4,762	16	0
Cleveland Bridge and Eng. Co., Darlington	4,677	4	1
F. Silvester & Co., Newcastle (Staff.)	4,669	10	0
Jesse Tildesley, Willenhall	4,622	0	0
C. Williams & Co., London	4,554	2	4
Butterley Co., Alfreton	4,540	19	9
Phœnix Foundry Co., Derby	4,392	0	0
W. C. Holmes & Co., Huddersfield	4,391	10	7
J. Shewell & Co., Darlington	4,391	12	10
Matthew Pitts, Leeds	4,319	0	0
Taylor & Parsons, Bradford	4,284	8	3
J. Butler & Co., Leeds	4,268	12	8
J. Crowther & Co., Huddersfield	4,262	16	9
Thos. Woodall, Dudley	4,236	12	10
Wm. Teall, Wakefield	4,215	0	0
Ashbury Railway Carriage and Iron Co., Manchester	4,110	0	0
Braithwaite & Kirk, West Bromwich	4,090	0	0
Clayton, Son, & Co., Hunslet	4,084	5	3
J. Bagshaw & Sons, Batley	4,080	0	0
R. & J. Dempster, Newton Heath	4,010	7	0
R. Taylor & Sons, Marsden	3,924	2	1
Newton Chambers & Co., Thorncliffe	3,880	12	11
John Lysaght, Limited, London	3,880	0	0
W. Richards & Sons, Leicester	3,835	4	7
Charlestown Foundry and Ironworks Co., Charlestown	3,600	0	0
Owners of the Wheatoe Foundry, Darlington	3,500	0	0

ISLINGTON.—For various fittings, &c., to premises, Upper-street, Islington, for Mr. T. R. Roberts. Mr. T. Kingwell Cole, architect. Messrs. Battam & Co., surveyors:—

Drew & Cadman, Holborn	£183	0	0
Sage, Gray's Inn-road	154	0	0
Wall Bros., Kentish Town (accepted)	147	0	0

LONDON.—For carrying up party-wall, 90, Park-street, Grosvenor-square, for Mr. G. Erlam. Mr. T. Kingwell Cole, architect. Messrs. Battam & Co., surveyors:—

Wall Bros., Kentish Town	£124	0	0
Toten & Son, South Kensington*	100	0	0

* Accepted.

LEICESTER.—For the construction of about 790 lineal yards of 12-in. stoneware pipe-sewers, together with manholes, lampholes, and other works in connexion therewith, in the West Leigh and Ash Leigh roads, for the Corporation of Leicester. Drawings, specification, and quantities by Mr. J. Gordon, M. Inst. C.E., Borough Surveyor:—

Innes & Wood, Birmingham	£500	11	0
J. Smith, Belgrave, Leicester	404	0	2
H. Black, Barrow by Soar	391	5	6
J. Dickson, St. Albans	389	14	4
A. Turner & Sons, Billston	377	15	9
S. & E. Bentley, London (accepted)	343	3	3

LONDON.—For new Wesleyan Methodist chapel and schools, Amhurst Park, N. Mr. Fred. Boreham, architect, Finsbury Pavement. Quantities by Mr. C. H. Love:—

W. M. Dabbs	£7,018	0	0
Dove Bros.	6,980	0	0
Williams & Son	6,976	0	0
J. Woodward	6,886	0	0
L. H. & R. Roberts	6,862	0	0
Hill Bros.	6,731	0	0
J. Anley	6,689	0	0
G. Jervis Smith	6,638	0	0
J. Grover & Son	6,583	0	0
R. & E. Evans	6,462	0	0
C. Wall	6,353	0	0
Lawrence & Son	6,343	0	0
J. Holloway	6,195	0	0
J. Green	6,080	0	0
J. Chessum (accepted)	5,953	5	0
J. Allen & Sons (withdrawn)	5,652	0	0

LONDON.—For works at Nos. 268 and 270, Edgware-road, W., for the Home and Colonial Trading Association (Limited). Mr. Robert Willey, architect, 66, Ludgate-hill:—

Alterations to Shop Front, &c.

Burman & Sons, Kennington	£485	0	0
Larter & Sons, City	450	0	0
Ashby Bros., City	426	0	0
Jones Bros., Ealing (accepted)	300	0	0

Fitting up, Painting, &c., Part of the Stores.

Jones Bros., Ealing (accepted)	513	0	0

LONDON.—For sundry works and decorations at No. 85, Avenue-road, St. John's Wood. Mr. Robert Willey, architect, 66, Ludgate-hill:—

Larter & Sons, City	£625	0	0
Haywayd & Sons, City	625	0	0
Ashby Bros., City	571	0	0
Burman & Sons, Kennington*	535	0	0

* Accepted.

LONDON.—For alteration to front of No. 6, White-street, Moorfields, E.C., for Messrs. G. D. Peters & Co.:—

J. O. Richardson (accepted)	£119	0	0

LONDON.—For additions to six houses at Bowes-road, Bowes Park, for Mr. T. Sidney. Mr. W. Smith, architect, 1, Gresham-buildings:—

Mattock Bros.	£515	0	0
Lark & Son	498	0	0
Dearing & Son	495	0	0
Wheeler	490	0	0
Clark Bros.	450	0	0
Ward & Lamble	427	0	0
Say	390	0	0
Langham	339	0	0

LONDON.—For pulling down and rebuilding the Little Wonder, Lamb's-passage, Bunhill-row, for Mr. T. Sugden. Mr. W. Smith, architect, Gresham-buildings:—

Clark Bros.	£1,730	0	0
Barnes	1,690	0	0
Lown & Son	1,550	0	0
Dearing & Son	1,529	0	0
Hayworth	1,493	0	0
Langham	1,478	0	0
Lascelles	1,475	0	0
Baylis	1,460	0	0
Mattock	1,433	0	0
Ward	1,347	0	0
Lark & Son (accepted)	1,244	0	0

LONDON.—For Westwood and Portland stone front to 17, Coleman street. Mr. Delissa Joseph, architect, 17 and 18, Basinghall-street:—

F. Tomes	£375	0	0
G. Herridge (accepted)	345	0	0

LONDON.—For alterations and additions to the Grapes public-house, London-road, for Mr. A. Bryan. Mr. A. C. Olley, architect:—

Ansell	£1,166	0	0
Balsam Bros.	1,100	0	0
Mower	1,085	0	0
Rider & Son	1,015	0	0
Jackson & Todd	992	0	0
W. & F. Croaker (accepted)	990	0	0

LOWER TOOTING.—For rebuilding the Angel Inn and two shops adjoining, for Mr. T. Booker. Mr. F. J. Eedle, architect:—

Rider & Son	£6,628	0	0
Mills	6,340	0	0
Kirk & Randall	6,065	0	0
Anley	5,989	0	0
Spencer & Co.	5,732	0	0
Smith	5,566	0	0
Canning & Mullins	5,472	0	0
Jackson & Todd	5,428	0	0
W. & F. Croaker (accepted)	5,342	0	0

NORTHAMPTON.—For new Temperance Hall, &c., Northampton. Messrs. H. H. Dyer & Son, architects and surveyors:—

W. Claridge, Banbury	£2,571	0	0
W. Heap, Northampton	2,490	0	0
Green Bros., Northampton	2,263	0	0
H. Martin, Northampton	2,243	0	0
W. Woodford & Son, Northampton	2,232	0	0
E. James, Banbury	2,209	0	0
D. Ireson, Northampton	2,190	0	0
G. Fisher, Northampton	2,150	0	0
J. Wingrove, Northampton	2,136	0	0
A. P. Hawkin, Northampton*	2,086	0	0
G. W. Souster, Northampton	2,062	0	0

* Accepted.

NOTTING HILL.—For general repairs to the house, No. 38, Ladbrooke-square, for Mr. J. A. Cruickshank. Mr. John Hudson, architect, Leman-street:—

Eaton & Co.	£181	0	0
W. Gladding	149	0	0
Coulsell Bros., Bethnal Green*	138	0	0

* Accepted.

PUTNEY.—For a lodge and additions to stables, conservatory, &c., at Wildcroft, Putney, for Mr. Geo. Newnes, M.P. Mr. Theodore K. Green, architect:—

Mark Manley	£2,349	0	0
L. & H. Roberts	2,290	0	0
John Woodward	2,277	0	0
R. Aviss & Co.	2,198	0	0

RATCLIFF.—For the erection of a school-keeper's house at the new school in Broad-street, Ratcliff (Tower Hamlets I.), for the School Board for London. Mr. T. J. Bailey, architect:—

W. Oldrey & Co.	£600	0	0
C. V. Howard	599	0	0
W. Johnson	590	0	0
J. Holland	583	0	0
G. Limn	561	0	0
Norris & Luke*	492	0	0

* Recommended by the Works Committee for acceptance.

STRATFORD.—For additions and alterations to No. 54, Romford-road, for Mr. L. Josephs. Mr. John Hudson, architect, Leman-street:—

North Bros.	£1,124	0	0
Eaton & Co.	1,115	0	0
Coulsell Bros.	1,095	0	0
Norton & Son	1,083	0	0
W. Gladding	963	0	0
W. Watson, Ilford (accepted)	875	0	0

STRATFORD.—For repairs to Byfield House, Forest Lane, for Mr. T. R. Roberts. Mr. T. Kingwell Cole, architect. Messrs. Battam & Co., surveyors:—

Osborne & Sons, Woodford	£118	14	0
Bishop & Webb, Stratford (accepted)	118	0	0

STRATFORD.—For various alterations and fittings to 86, Broadway, Stratford, for Mr. T. R. Roberts. Mr. T. Kingwell Cole, architect. Messrs. Battam & Co., surveyors:—

Sage & Co., Gray's Inn-road	£159	0	0
Osborne & Sons, Woodford	143	0	0
Wall Bros., Kentish Town (accepted)	132	0	0

STROUD GREEN (Hornsey).—For the erection of Holy Trinity Vicarage House. Mr. Edward Turner, architect, 21, Hart-street, Bloomsbury. Quantities by Mr. Chas. Granville Baker, 5, Bloomsbury-square:—

Smith & Lunn, Newark-on-Trent	£1,959	0	0
Mattock, London	1,833	0	0

WEST BROMWICH.—For the erection of two villas, Beeches-road, West Bromwich (Staffs.), for Messrs. Mantell & Bunn. Messrs. Geo. Benj. Nichols & Son, architects, 59, Colmore-row, Birmingham:—

John Harley & Son, Smethwick	£1,150	0	0
Richard Heelis, West Bromwich	1,099	0	0
C. A. Horton, Brierley Hill	979	0	0
Walton Bros., Smethwick	895	0	0
R. & E. Woodward, West Bromwich	877	0	0
William Fisher, West Bromwich	850	0	0
Arthur Wilkes, West Bromwich*	845	0	0

* Accepted.

WESTMINSTER.—For new warehouses at Regency-street, Westminster, for Messrs. W. Sugg & Co., Limited. Messrs. Drury & Lovejoy, architects. Quantities by Mr. W. H. Strudwick:—

Lucas & Son	4,992	0	0
Holland & Hannen	4,990	0	0
Mowlem & Co.	4,815	0	0
Chappell	4,568	0	0

WHITECHAPEL.—For alterations to the "East London" public-house, for Mr. Morris Abrahams. Mr. John Hudson, architect, Leman-street:—

Coulsell Bros.	£209	0	0
Eaton & Co.	205	0	0
W. Gladding, Mile End (accepted)	198	0	0

*** SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than 12 Noon on THURSDAYS.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

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SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.

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DOUGLAS FOURDRINIER, Publisher,
Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY mornings.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

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AN EDITION Printed on THIN PAPER, for FOREIGN CIRCULATION, is issued every week.

MAP OF LONDON, showing Boundaries of Surveyors' Districts. The four Sheets, into which the Map is divided (issued with the numbers of January 1st, 8th, 15th, and 22nd), if sent to the Office direct, or through any Newsagent, can be MOUNTED on the following Terms, viz.:—

On Cloth (Rollers) and varnished, 3s. 6d.
" (Strainer) " 5s. 6d.

N.B.—In the case of "Strainers," if packed for rail or carrier, 1s. 3d. extra.

*** Omissions discovered since publication will be corrected before mounting.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied DIRECT from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum PREPAID. To all parts of Europe, America, Australia, and New Zealand, 26s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittances payable to DOUGLAS FOURDRINIER, Publisher, No. 46, Catherine-street, W.C.

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BEST STOURBRIDGE FIRE BRICKS, and Cement Fire Clay, Gas Retorts, Muffles, &c. Fire Bricks and Blocks for the Highest Heats, for Iron Blast Furnaces, Forge, Rolling, Puddling, and Steel Furnaces, Flint Glass Furnaces, Roasting and Refining Furnaces, Chemical Works, Coke Ovens, &c. Boiler Seating Blocks, Fire Covers, Locomotive Bricks, Tuyeres, Steel Runners, Grate Backs. Special Sizes and Shapes made to Engineers' Drawings. Prices quoted to any Port or Railway Station.

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TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

R. M. F.—T. G. W.—C. J. S.—W. S.—S. G. (should have sent amount).—E. & L. (ditto).—Parkes Museum (too late, though a week old when sent).—T. H. A.—W. C. M. (your communication was illegible).—M. H. J. (too late; only received on Thursday morning).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

Best Bath Stone.

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BOX GROUND. COMBE DOWN.
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